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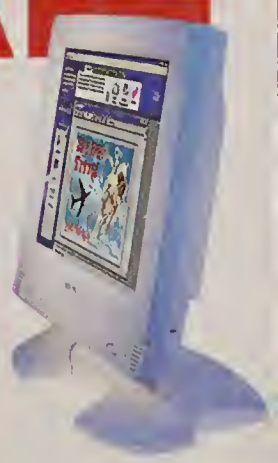

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***Fortune*, May 26, 1997**

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***PC Magazine*, August 1997**

"All in all, Navigator 4.0 is the best Web browser available today."

***Wall Street Journal*, July 10, 1997**

"Unlike Microsoft's Webcaster push technology, Netscape's Netcaster uses existing standards such as HTML, Java and JavaScript."

***InfoWorld*, June 2, 1997**

"But there's further cause for celebration. For instance, Communicator 4.01 consumes about 3 MB of RAM less than Navigator 3.0."

***C/Net*, July 10, 1997**

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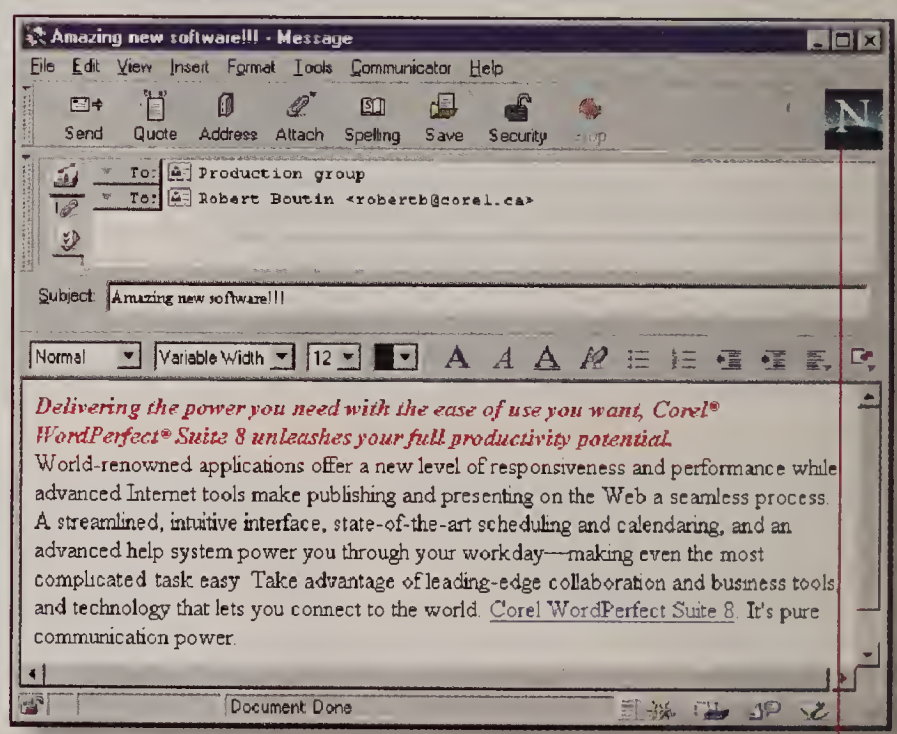

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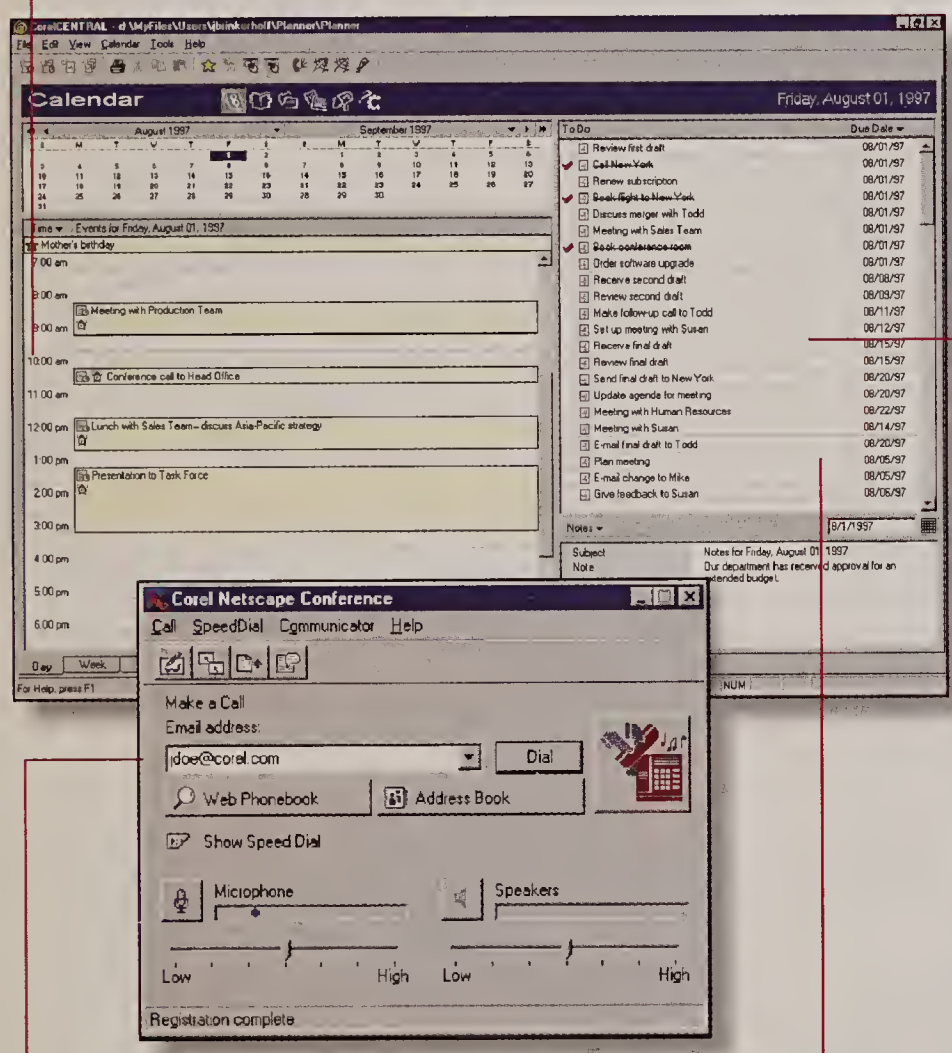

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PC WORLD

DECEMBER

VOLUME 15 ◆ NUMBER 12

COVER STORY

TOP 100 HARDWARE BUYS: FROM BEST PCs TO MUST-HAVE GEAR

HARDWARE BUYS

It's the end of 1997, and we've discovered dynamite buys for hard-to-please technophiles, from great gadgets to all-purpose printers to powerful PCs. Our Top 100 Hardware Buys helps you pick great products and avoid overhyped clunkers.

154 GADGETS, GIZMOS, AND GEAR
181 PERSONAL PRINTERS: TEXT, GRAPHICS, AND...PHOTOS?
293 DREAM HOME PCs

FEATURES

154 GADGETS, GIZMOS, AND GEAR

HARDWARE BUYS

Toss out that Sharper Image catalog! These high-tech gizmos are great for work or play. Store 250MB on tiny cartridges, surf the Web on a cell phone, revel in palm-size, big-sound speakers. To satisfy gizmo lust, start here.

181 PERSONAL PRINTERS: TEXT, GRAPHICS, AND...PHOTOS?

HARDWARE BUYS

online

Personal printers can produce sharp text and vivid color—so now photo quality has become The Next Big Thing. We test 23 printers, from color ink jets to monochrome lasers, and find you can't expect to print photos good enough to frame.

206 COMMUNICATOR VS. INTERNET EXPLORER: AND THE WINNER IS...

REVIEW

online

Despite unstable installations, innovation wins out in this browser war: desktop integration, easy-to-track browsing, automatic URL entry, powerful e-mail. Our take: For now Internet Explorer has the edge.

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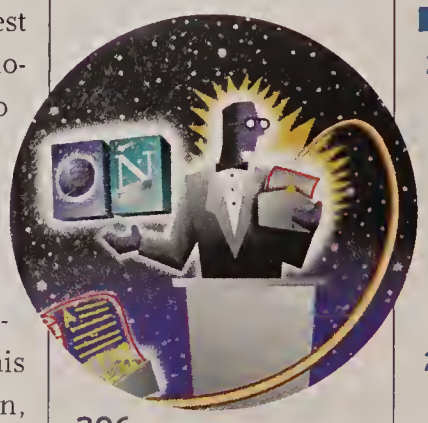

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online

Additional material available on PC World Online: www.pcworld.com

243 AGP GRAPHICS: A BUMPY RIDE

PREVIEW

Intel's new graphics bus promises enhanced 3D and faster performance on Pentium IIs. But our tests pitting the first AGP cards against PCI cards reveal potholes on the road to rip-roaring 3D. We'll explain how to avoid problems and find an AGP board that'll work for you.

SPECIAL REPORT

SMALL OFFICE, HOME OFFICE

267 THE DO-IT-YOURSELF NETWORK

Does your small office share files? Applications? Printers? Modems? Of course it does. Take our friendly consultant's advice: Networking your small office doesn't have to be expensive or complicated.

279 HOT PICKS FOR THE HOME OFFICE

Quicken for home businesses, a $999 color copier, Internet e-mail on steroids, and more.

COVER *Photographs by Kevin Candland*

ICONS: JEFFREY PELO

TOP OF THE NEWS

58 NT 5.0: WINDOWS WORTH WAITING FOR?
Adding a slick Win 98 interface to NT's established stability and security, NT 5.0 could be a good alternative for businesses. But be careful—compatibility problems persist.

68 "CENTAUR INSIDE" MEANS HIGH PERFORMANCE ON A BUDGET
Centaur's C6 delivers PCs that match Pentium MMX performance on Win 95 apps but cost a third less.

74 MOOOVE OVER GATEWAY...
Eleven vendors challenge Gateway by offering custom-built PCs that you can order on the phone or the Web.

78 TV-STYLE ADS INVADE THE WEB
Full-blown ads with slick animation and sound may soon interrupt your surfing.

80 WINDOWS CE 2.0 ADDS POWER, COLOR
Better performance, larger color LCDs, and better connectivity are improvements that come with Windows CE 2.0 palmtops.

NEW PRODUCTS

106 Boca Video Communications Suite
107 Hewlett-Packard Brio PCs
110 NEC SuperScript 750C, 150C color ink jets
112 HP SureStore CD-Writer Plus 7110 drive, Creative Labs PC-DVD Encore Dxr2 kit
116 Power Computing PowerTrip notebooks, InnerBay Zip Drive
119 Kodak DC210 Zoom, Yashica KC 600 digital cameras
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124 Iomega Ditto Max backup drive
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139 Matrox Video, Graphics, and TV Kit, Matrox m3D
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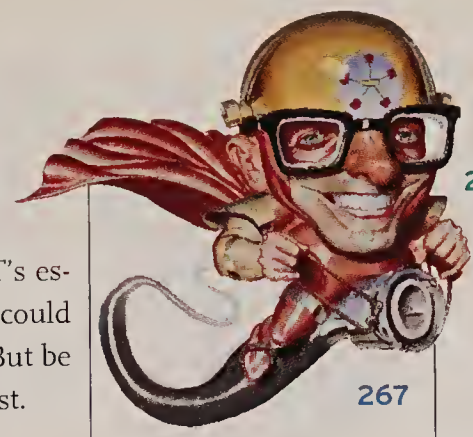
146 CrystalGraphics Crystal 3D Impact



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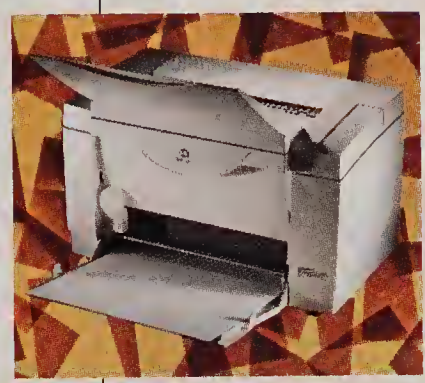

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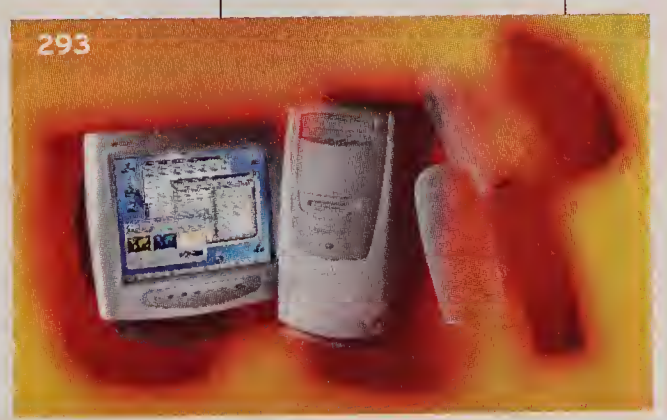

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TOP 100

293 DREAM HOME PCs
TOP 100 HARDWARE BUYS online Why are they dream home PCs? Easy setup, piles of home software, and lots of extras. Our expanded Top 10 Home PCs chart has something for everyone, from HP's speedy but pricey Pentium II-266, to Gateway's $1499 PMMX-166 that comes with—surprise!—a color printer.

296 POWER DESKTOPS
TOP 20 Many PCs debuting on the Power chart this month are Pentium II-266s, as are two Best Buys from Dell—the Dimension XPS D266 and the OptiPlex Gxa266.

312 BUDGET DESKTOPS
TOP 20 With PCs averaging a little over $1500, the Budget chart never looked more tempting. Among the most enticing: Quantex's new $1949 Pentium MMX-233.

324 NOTEBOOKS
TOP 10 Gateway's Solo 2300XL claims two records—the fastest portable we've tested and longest battery life.

332 HOME PCs
TOP 10 Our top pick for power home PC is Dell's PMMX-233 Dimension XPS M233s, packed with a 4.2GB hard drive and an Iomega Zip drive. The top budget home PC is Gateway's Pentium MMX-166, which comes with a color printer for $1499.

337 PERSONAL PRINTERS
TOP 10 Minolta's PageWorks 6L is our new monochrome Best Buy, while Canon's BJC-4300 cops the color Best Buy.

339 15-INCH MONITORS
TOP 10 Four newcomers move onto the chart this month, led by models from Goldstar, MAG, and MaxTech.

343 GRAPHICS BOARDS
TOP 10 ATI's Xpert@Work debuts with speedy 2D but so-so 3D images.

345 MODEMS
TOP 10 Global Village's 56-kpbs modem is number one with its easy installation and dirt-cheap $119 price.

HERE'S HOW

370 **ANSWER LINE**
Pick the default programs for particular file types, open Internet Mail fast, password-protect Win 95.

378 **WINDOWS TIPS**
online Get the hang of keystroke and mouse shortcuts, root out print problems.

386 **SPREADSHEETS**
Create charts that resemble Gantt charts in Excel, shrink 1-2-3 97's InfoBox.

390 **WORD PROCESSING**
online Make long documents easier to navigate, track revisions in Word 97.

396 **INTERNET TIPS**
Automate e-mail in Internet Explorer 4.0 and Communicator 4.01.

404 **HARDWARE TIPS**
Check out the best ways to keep your PC, mouse, and keyboard clean.

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Install a second EIDE hard drive, step-by-step.

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@HOME

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Get your photos digitized and distributed, over the Internet or with the latest printer/scanner/copier/fax machine.

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online How to improve Windows 95, without Microsoft.

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DEPARTMENTS

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25 **LETTERS** Readers sound off on Win 98 and desktop/Web integration, tech support travails.
online

33 **CONSUMER WATCH** Find out which of the companies you've bought from are this year's saints and sinners.

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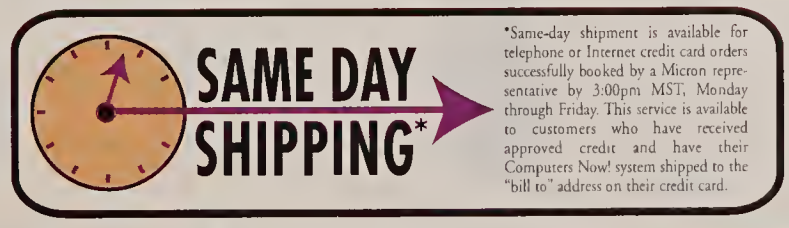

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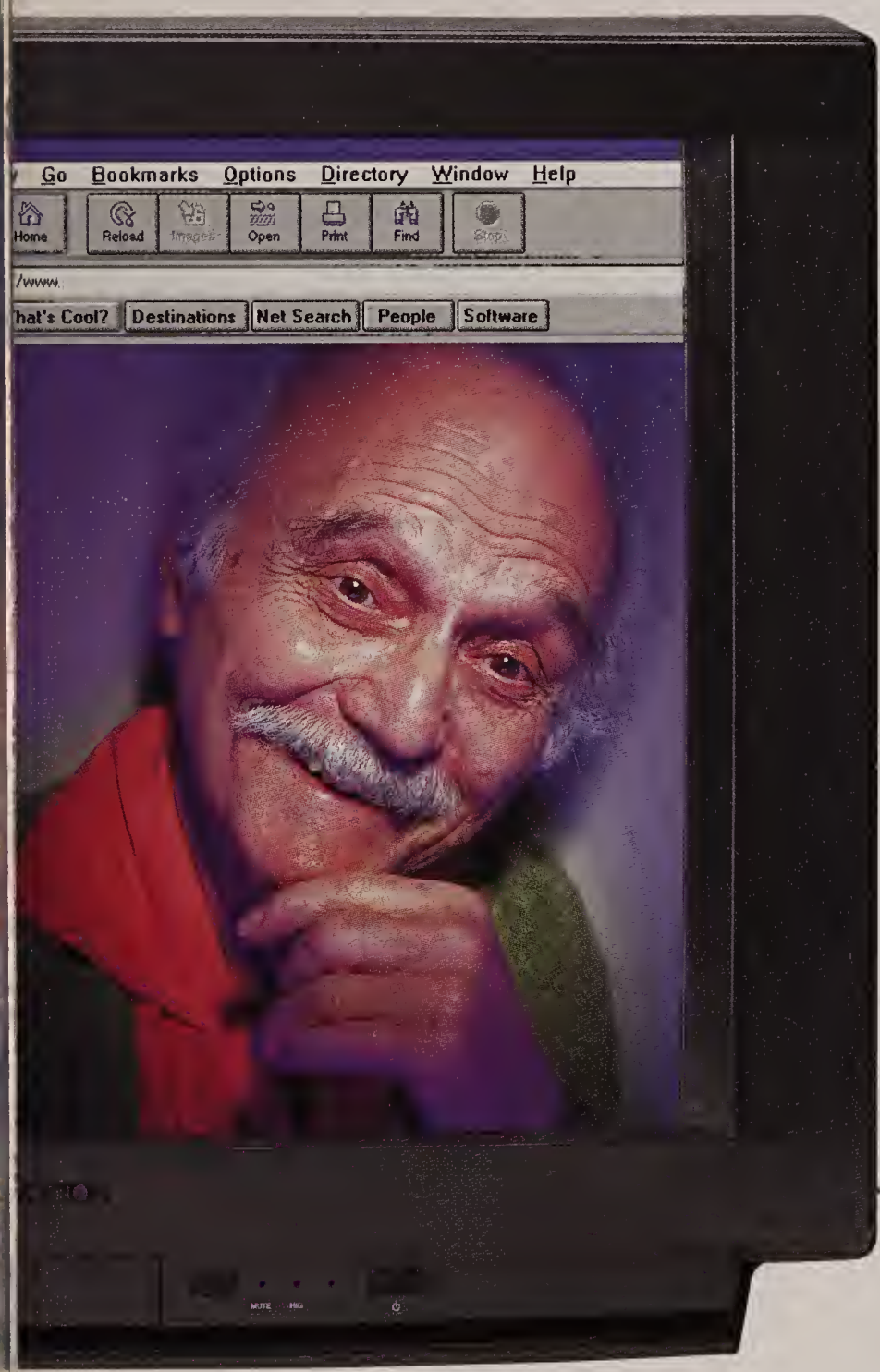

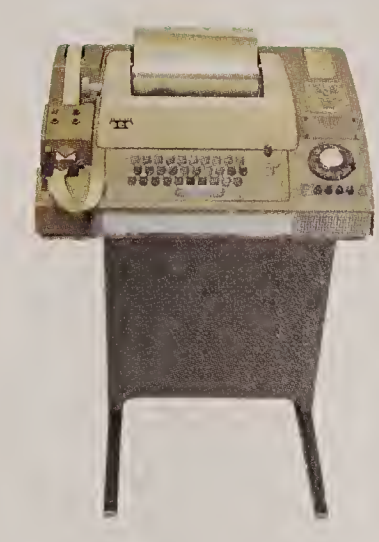

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Will the Grinch Steal DVD?

IT'S NOW OVER A YEAR since DVD was supposed to be introduced, and six months since it went on sale. You might expect to settle down right now with a long article about hot new Digital Video Disc titles that exploit DVD and 3D graphics to transform PC games and training programs. Sadly, there are few worthy DVD-ROM titles for us to tell you about. Since we've waited years for a superior successor to the aging CD and CD-ROM, you'd think entertainment and software firms would be racing to issue movies and games on DVD.

True, DVD's initial introduction was delayed while electronics companies fought over potential royalties, and some entertainment firms fretted about copy protection. The royalty disputes were resolved, and the overwhelming majority of relevant industries agreed that the copy protection issue had been adequately addressed. DVD players started shipping early this year. At last, the stage was set for the move to a new and vastly superior standard.

One Divx "benefit": stiffing the people who've already spent $500 to $1200 on DVD players and drives.

ENTER DIGITAL VIDEO EXPRESS

AS THE HOLIDAYS approach, Disney has finally announced that it will bring out its titles on DVD, removing another obstacle to the standard. Yet there aren't as many DVD movies as there should be, and even fewer DVD-ROM titles. Why such a delay in exploiting a major technological breakthrough—the best hope for reinvigorating the consumer electronics industry and providing the hottest possible upgrade for tens of millions of PCs? The lag isn't a matter of chance, and it's more than the usual delay in adopting new technology. Villains are at work. Call them collectively the grinch of DVD.

Circuit City, Paramount, and a gaggle of Los Angeles entertainment lawyers have bombed the nascent DVD market with Digital Video Express—or Divx—a competing format apparently designed to suffocate DVD in the cradle. And what better way to kill a new format than to render obsolete all its players? That's one of the "benefits" of Divx: stiffing the half-million people who've each already spent $500 to $1200 on DVD players and drives.

The Divx cabal claims to be providing other impressive benefits. It says consumers will like paying $5 or so for one-time use of a disc holding data that becomes inaccessible 48 hours after it's viewed. Since there's no need to return the disc to the video store, Divx is supposed to be more convenient than renting a standard DVD, and less expensive than buying one. But this argument lacks plausibility. From a cost/benefit standpoint, $5 for a single viewing is a rotten deal compared to $20 for lifetime use. And while you can supposedly call the Divx store and pay to get the movie reactivated for another viewing, how do you know they'll still be in business? You're much better off owning a disc you can play without calling to ask permission or paying each time you view it.

NEVER OWN A MOVIE AGAIN

WANT MORE DIVX "benefits"? Your Divx player must be connected to a phone line so the video police can keep tabs on your viewing and grant rerentals permission. And don't even think of putting the discs in your PC—there are no plans to make Divx available for them. What a deal!

Who would really benefit from Divx? Most visibly, Circuit City and Paramount. While Circuit City plans to compete with video rental companies like Blockbuster, Paramount would be delighted to see DVD die. It is more concerned about inviolable copy protection than giving consumers vastly superior quality. It has no plans to issue its movies on DVD. If you don't want to buy a Divx player and pay for each use, Paramount wants you restricted to low-resolution VHS movies. You'll be able to buy DVD movies from Warner Bros., New Line Cinema, MGM, Universal, Sony's Columbia Tri-Star, and Disney's Buena Vista (which distributes Disney, Touchstone, Hollywood Pictures, and Miramax releases). But count Paramount out.

The best hope for DVD's success is that Divx will die early, with consumers rejecting both Divx players and discs. Otherwise, plan on a replay of the impasse in the early days of videotape, when the VHS and Betamax formats competed and many, many consumers waited to see which would win. For years, most people bought neither, hardware makers produced neither, and few got pleasure or profit from VCRs and videotapes.

Paramount and Circuit City have tried, grinchlike, to spoil what figured to be the first booming season for DVD. They stand between you and a new generation of video and PC entertainment. Remember this when deciding which movies to watch during the holidays and where to buy electronic gifts. And hope Paramount and Circuit City will remember how the grinch came to his senses after perpetrating his terrible deed.

Phil Lemmons is editorial director of PC World. ■

PHOTOGRAPH: ERIK BUTLER

Building still

For example, do you

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From: New Microsoft FrontPage 98
Time: Friday, 8:30 a.m.
To: Communications
Re: Anyone there know how to build a Web site?

Forget about all the coding stuff. Whether you're a novice or a pro, our new Microsoft® FrontPage® 98 program makes building a Web site as easy as typing a letter. That's because, as part of the Microsoft Office family, it's filled with familiar, intuitive tools. The new Navigation View helps you plan and organize your site. Drop your ideas into professionally-designed page themes, or use the new table drawing tool that makes designing pages as easy as sketching with a pencil. You can create and edit graphics and animation. As you work, you'll see your Web pages exactly the way they will look on the Web. And all the technologies that make Microsoft FrontPage 98 so powerful—such as Dynamic HTML and push technology—work behind the scenes. So when you're ready to go public, you just click on a single button and your site is on the Web. Check it out at www.microsoft.com/frontpage/. Yes, we built it with FrontPage 98. And yes, it was easy.

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Contrast Ratio	150:1	120:1	100:1	150:1
True Resolution	1,024 x768 (XGA)	1,024 x768 (XGA)	1,024 x768 (XGA)	1,024 x768 (XGA)
Landscape/Portrait Modes	Yes*	Landscape	Yes*	Yes*
OnView® Controls	Yes	Yes	Yes	Yes
ViewMatch® Color	Yes	Yes	Yes	Yes
Low Emissions	Yes	Yes	Yes	Yes
Built-in Audio	1.0 Watt x 2	No	1.0 Watt x 2	1.0 Watt x 2

*Utilizing supplied Perfect Portrait software. May not be compatible with all software.

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YOUR TAKE ON: Tech support ◆ Internet filters ◆ Rating 3D boards

THE OTHER SIDE OF SOFTWARE TECH SUPPORT

AS A PERSON who provides telephone technical support for my company's products, I read with interest "Want Good Tech Support? Good Luck..." [October]. A few more points should be addressed:

Call from somewhere in the vicinity of your computer. In many cases, the technician will have you look up information or change settings.

If you can't call when technical support is open, don't complain to the technician about inconvenient support hours. These comments should instead be directed to customer service.

If you are trying to get two or more products to work together, don't be upset if the technician for one product refers you to the support line for the other. If problems persist, ask one of technicians if they'll agree to a conference call with someone from the other company so they can work together on a solution.

If a technician asks you to do something you don't know how to do, ask for more specific instructions. And don't hesitate to ask that the instructions be repeated more slowly and clearly.

If a technician asks you to do something and a message appears on screen, tell the technician. Unexpected messages can point to the source of a problem.

Scott A. Begin, Chicago

I AM A CUSTOMER support technician for one of the companies that you reviewed. I really like my job, but it can also be very frustrating and stressful. We have to put up with far too many callers who are rude, uncooperative, and sometimes downright abusive. This kind of treatment is a big reason we see such a large turnover in my section.

Name withheld at writer's request

I USED TO work for a large third-party technical support firm. I left due to the way they were treating the tech staff. Technicians are on the *low* end of the pay scale. You can imagine the type of technician that policy brings. When I started, most techs were very good. As the company grew, the quality of training for the techs went down drastically. By the end of that year, six months' training had been reduced to, "Answer the phone like this, listen to this tech [shadow them on the phone], and take calls by the end of the day." No exaggeration.

The people getting raises and bonuses were those who could get the customer off the phone quickly and handle the most calls. The support was bad, to say the least. The fast tech would give quickie advice to get a customer off the phone, but other techs knew they would have to spend 30 minutes not just diagnosing the problem but talking an irate customer through ▶

HOT BUTTON

Windows 98: Caught in the Web?

REGARDING YOUR Windows 98 preview in September's *Top of the News*, who really wants Windows 98 to change your desktop into Internet Explorer 4.0? I haven't found anyone who likes this idea. If we want to use the Web, we will use a browser. The Web isn't some grand heaven, but rather an overhyped procrastination tool. I downloaded Internet Explorer 4.0, and my desktop turned into Internet Explorer Deluxe. Everything is a link—open a window, and it's an Internet Explorer window. What if we don't want to upgrade to this desktop-browser garbage? Is there any alternative to this slow, horrendous combination? The Web is buggy in itself. Do we really want to jump into an entirely new arena of Java applets and HTML code taking over our PCs? I speak for many when I say I am scared of where Microsoft is taking our computers.

Eric Johnson, Foster City, California

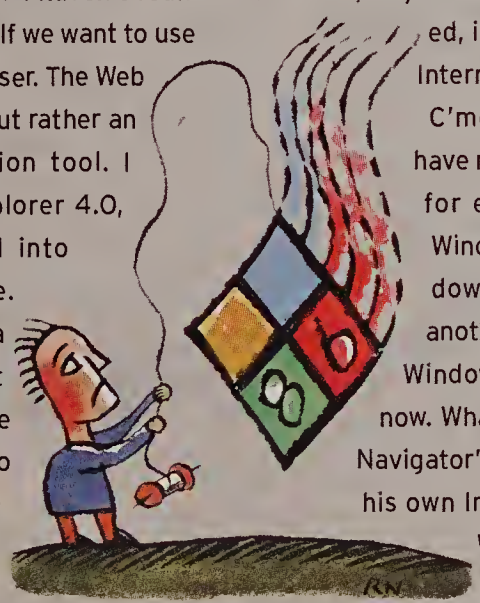

ILLUSTRATION: ROBERT NEUBECKER

YOUR SEPTEMBER ISSUE left this user more convinced than ever that Bill Gates is the Michael Jordan of capitalism. For instance, why is it that Windows 98 is included, in nearly its entirety, with Internet Explorer 4.0?

C'mon, guys, you seem to have missed Microsoft's reason for essentially giving away Windows 98 for the price of a download. Gates isn't after another mega-blockbuster like Windows 95, at least not right now. What he is after is Netscape Navigator's turf, and by integrating his own Internet browser with the Windows desktop itself—and adding some nifty features to that operating system in the process—he has really hurt Netscape.

As an OS/2 fan and a native Chicagoan, I guess I now know what it's like to be on the other side of one of those Jordan three-pointers. Ouch!

Jon Trott, Chicago

IN THE SEPTEMBER *Up Front*, Cathryn Baskin states, "Windows 98 may turn out to be one operating system upgrade you really don't need." Her opinion is representative of many in the industry. However, the pundits seem to have missed one important point: The lack of certain stardom for Windows 98 is a profound testament to just how good Windows 95 really is. Gates and company have created a product that has generated (mostly) love and hate for the past two years, but the plain fact is that it has forever changed the way PC users interact with and use their machines.

Jeff Bellune, Internet

I WAS NOT optimistic when I heard about Internet Explorer 4.0's desktop integration. But IE4's beta 2 convinced me. Program launching is easier, the desktop Web pages are surprisingly useful, and Outlook Express is my favorite mail client. Best of all: IE4's customizability. I quickly identified the parts of it I didn't like and shut them down.

Ezra B. Riner, Internet

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i was here

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replacing the card, fixing the software settings, or whatever.

Another problem with third-party tech support: The vendors we were supposed to be supporting were not always forthcoming with information about known problems, fixes, updates, and the like.

Name withheld at writer's request

WHERE ARE THE ANSWERS?

HOW DARE YOU print the three questions for the tech support article by Naomi Wise in the October issue ["Want Good Tech Support? Good Luck..."] and then not include the answers! I want to know if I should make my swap file bigger, too.

I think you owe it to your readers (especially the novices) to publish the answers to all the questions.

Ronald Hirsch, Internet

Editor's response: The questions we posed to vendors were used merely as vehicles to rate the quality of their services. We realize that no one likes an unanswered question, so we did publish both the questions and answers on PC World Online (www.pcworld.com/oct97/support), and we noted this at the start of the article. –Michael S. Lasky

THE POWER OF E-MAIL

YOUR ARTICLE ON the power of e-mail ["Don't Get Mad, Get Online," *Consumer Watch*, October] reminded me of a recent incident at a Home Depot store near me.

After purchasing several items from the store, I drove away not realizing I had left a bag in the parking lot. Two days later I inquired about my items. I was told that they had been found but that I was out of luck since they had already been returned to the shelf. My receipt was null and void. I went home in a state of shock.

Determined to get satisfaction, I surfed the Internet to find Home Depot's Web page. I e-mailed my complaint, and within 36 hours I received a call from the store manager saying I could pick up my purchases at my leisure. Truly, no company can withhold service to anyone now that there are corporate Web pages to which anyone can post a message of complaint.

Jerry Rabo, Internet

WEB AUCTIONS: BEWARE

THE ARTICLE ON Web auctions in September's *Internet Tips* was very timely. I tried the online auction site of what I thought was a respectable company. They were selling a popular product's previous version, LapLink 7.0. What they did not tell potential buyers is that it was not the retail version, complete with the needed cables, but a cheap throw-together with a photocopied manual. They called it a new product. A big rip-off—and they do not allow returns on auction products. So your comments about being careful cannot be taken seriously enough. I will not use these auctions again.

Daniel Emmanuel, Houston

NIGHTMARE ON DELL STREET

IN THE SEPTEMBER *PC World* I was featured in "What a Pain! The First Six Months of Owning a PC." A sequel might be "Surviving the Second Six Months."

To be honest, Michael Dell's folks [Dell Computer] have been pretty square with me. But the bottom line is, he's got my $3000 and I've got a bunch of plastic-coated white boxes in my family room, doubling as dust magnets.

The story: Three weeks ago, a speaker switch breaks. Dell replaces all three speakers—no charge. Then the hard drive goes up in smoke. Dell ships out a new one and sends a technician to my house. When he leaves, I've got my computer again. Or so I think.

I turn on the PC—and all I get is a blank screen. Five hundred dollars in software is up in smoke with my old hard drive.

"That's what backup disks are for," the Dell tech tells me, in a patronizing tone. I've waited 40 minutes, and this is the advice I get.

Mr. Dell Tech walks me through a couple of check-directory moves on my backup disks. His diagnosis? I lack one file ▶

CORRECTIONS & CLARIFICATIONS

The Web address we printed in September's *Bugs and Fixes* for Netscape Navigator Gold 3.02 was incorrect. The current version of Navigator Gold is 3.03, and the correct URL is ftp://ftp5.netscape.com/pub/navigator/3.03/shipping/english/windows/.

PC World regrets the error.

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to install all my other stuff: Windows 95 CD-ROM and printer drivers, joystick, Norton Utilities—everything depends on it. "You may purchase the file, if you wish, from Dell," he says guardedly.

"Get me your supervisor," say I. Another 5 minutes pass. Finally, Mr. Dell Tech is back, saying that the file will be sent via snail mail. I'm still waiting.

Meanwhile, my oldest daughter is fuming; she can't write her English report. My second-oldest daughter needs a map off the Internet. My wife is expecting e-mail from her sister in Phoenix, and my youngest daughter wants to play Virtua Fighter.

Mike, read this. End this nightmare on Dell Street.

David de Felice, Madison, Wisconsin

BEYOND INTERNET FILTERS

AN ADDENDUM TO the October *Top of the News* story about Internet filters: While I agree that parents should do what they can to keep kids away from adult material, I also believe that adult-site Webmasters should do their part. Two things come immediately to mind.

First, they should register with the Recreational Software Advisory Council on the Internet so parents can block the site if they wish. (RSAC's Web site is at www.rsac.org.)

Second, adult-site Webmasters should consider using an age-verification service. These work by using a person's credit card to verify that they are an adult, then assigning them a user name and password to enter the site.

Todd Willeat
Maryland Heights, Missouri

3D GRAPHICS BOARDS: DO REVIEWS MISS THE MARK?

I READ WITH intense interest your article "2D and 3D Graphics Boards: You Can't Always Get What You Want" [October]. I am hooked on flight and racing simulations. Smooth and fast frame rates and eye-popping visuals are what I look for. Last February I purchased the Matrox Mystique graphics card based on its *PC World* number one ranking [in December 1996] and your "best 3D" rating.

I am now confused when author Brad Grimes says of the Matrox Mystique 220 card, "The Mystique's [3D images] are some of the ugliest we've seen." The review's conclusion: "Direct3D games just don't look good with this graphics board." How did the Mystique go from "best 3D" for several months running to "the ugliest we've seen"?

Chuck Stewart, Muskegon, Michigan

AFTER SEEING the STB Nitro 3D graphics board reside at number one in your Top 10 Graphics Boards for three months running, I purchased one based on its "fast 2D and 3D performance" as well as other information in the article. The October issue's roundup of graphics cards, however, states that the Nitro has below-average 3D. I spent $149 plus tax based on your review and now have a video card that "just isn't able to handle 3D games." Thanks a lot. I guess I should have waited six months after the Top 10 pick to see if you changed your minds.

Charles Goulding, Internet

Editor's response: Before the October issue, our 3D tests included games written specifically for the boards we tested. It was true in February and is true now that the Mystique provides some of the best 3D when used with Mystique-specific games. For our October issue, we tested boards with Direct3D games, which are meant to run with all 3D boards on the market. With our Direct3D games, the Mystique gives poor results.

As for the STB Nitro 3D, it continues to provide relatively fast 3D, as shown in our frame rate tests, but its 3D image quality—the way an image looks rather than how fast it is drawn—is below average. Some gamers will sacrifice image quality for fast game play. We look for both when evaluating 3D boards. **–JoAnne Robb**

I AM A LITTLE DISAPPOINTED that the Monster 3D and Righteous 3D graphics boards aren't ever listed in your Top 10 Graphics Boards. They completely trash the others in every category. And they now cost about $150. They've been out for a couple of years and are still the best. Everyone I know has one.

I see the Diamond Stealth 3D 3000 board at number two on your list [October]. But 3Dfx boards like the Monster and the Righteous run at least three times what the Diamond could put out, and the games look ten times better.

Derek Estey, Bristol, Vermont

Editor's response: We agree. The Monster 3D and Righteous 3D boards deliver better 3D than those in the Top 10. But because they are add-in boards and don't run regular 2D programs, we can't consider them along with the other graphics boards. **–Brad Grimes**

WEB COMMERCE

ERIC FLORACK [October *Letters*] misses the point of August's "Web of Deceit" article. He asks, "Is Janice [Norton], or anyone else, really so disappointed that private enterprise has a new tool with which to do its job?" In a word, yes. We are constantly assaulted with advertising, and its quantity and intrusiveness only increase.

It saddens me to see the Internet, a medium so perfectly suited to the exchange of ideas, so thoroughly and quickly reduced to nothing more than a huge electronic shopping mall. And now we have push technology, removing even the illusion of a choice regarding this assault.

My greatest objection, however, is to commercial sites that masquerade as genuine content—the point of your article. We just don't want to be lied to, but people like Florack seem to think anything is acceptable, so long as it makes money. Ethics? Who needs 'em? *We* do, that's who. Commerce is not evil. Unethical commerce is. We can tell the difference.

Bill Hanna, Cleveland

Find files mentioned in this article at www.pcworld.com/oct97/support. PC World *welcomes your responses, ideas, and other letters to the editor.* *See page 14 for contact information.* ■

ILLUSTRATION: ROBERT NEUBECKER

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Christian Murphy was non-verbal. He lived with a wall between himself and the world.

1 THIS IS CHRISTIAN.

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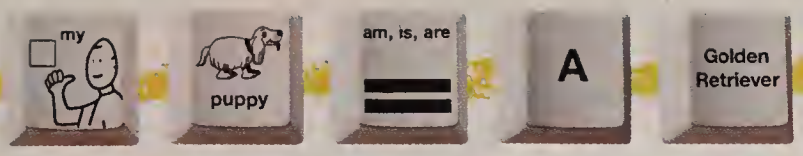

2 A TEACHER DISCOVERED *that Christian would respond to images from his life. She put visual cues to the story of his new puppy on a special keyboard.*

NEC MultiSync Monitors
E and A Series

3 THE MONITOR BECAME HIS VOICE. *With it he makes class reports and conversation. With it, Christian, 11, has been in the regular Osterville, MA public school since first grade.*

Until he found this window.

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E500	1280 x 1024 @ 65Hz	119MHz	CROMACLEAR	0.25mm mask
E700	1600 x 1200 @ 65Hz	177MHz	CROMACLEAR	0.25mm mask
E1100	1600 x 1200 @ 65Hz	177MHz	Dot Trio	0.28mm dot

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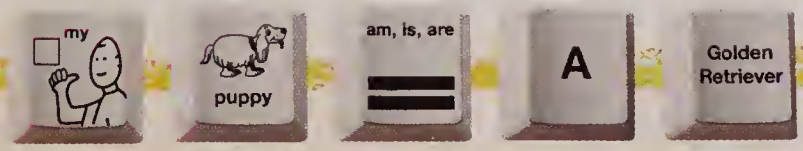

Circle 205 on reader service card

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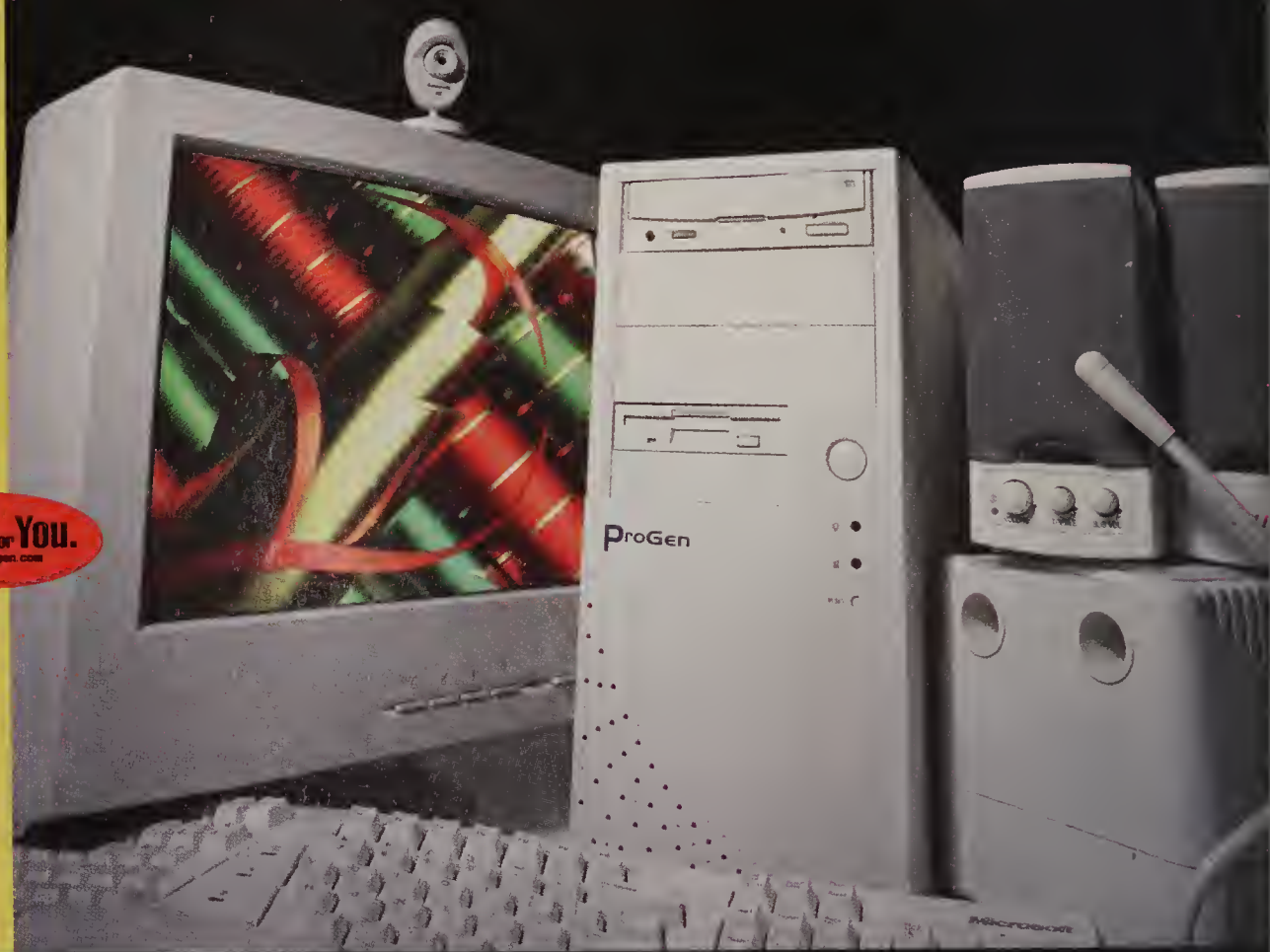

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Circle 184 on reader service card

Saints and Sinners: 1997 in Review

Some companies do it right. Some do it wrong. None of their actions go unnoticed.

ILLUSTRATION: ROBERT RISKO

WHAT DO AMERICA ONLINE, Compaq Computer, and Microsoft all have in common? You probably guessed it. But besides being the market leaders in their respective fields, these three companies also have the dubious distinction of committing major blunders in the past 12 months that incurred the wrath of many of their customers. Like many companies before them—and undoubtedly many more to follow—these computing giants let their market share and marketing muscle blind them to the importance of putting customers first.

Rather than letting these transgressions or the year's better proconsumer moves go unnoticed, I've compiled a list of 1997's saints and sinners. Saints are companies that over the past year have demonstrated a sincere commitment to their customers and have contributed to the healthy competition that keeps the PC industry strong. The sinners are—like the trio mentioned earlier—companies whose actions or inaction demonstrate a disregard for the very consumers on whom their livelihood depends.

SAINTS: Advanced Micro Devices and Cyrix. In an Intel-dominated computing world, these two companies have managed to keep the competition—and the processor wars—alive. With the K6 and 6x86MX processors, respectively, AMD and Cyrix offer PC makers a viable alternative for Pentium-class performance. Although the alternative chips are still being used primarily by second- and third-tier PC companies, they're providing budget-conscious consumers with a fast-performing, low-price PC alternative. Is Intel feeling the pressure? My guess is yes, judging from the company's recent price drops.

SINNER: America Online. No list of sinners for 1997 would be complete without America Online and its chair and CEO, Steve Case. First, there was the fiasco that brought the service to its knees shortly after it switched to its flat-fee plan. It sounded like a great deal for Web fans, but turned into a disaster when AOL's system couldn't handle the phenomenal increase in traffic (so much for advance planning) and customers were met with constant busy signals. Irate users filed a class-action suit, and an overwhelmed AOL invested in more equipment and agreed to credit customers who complained with additional time. Not leaving bad enough alone, AOL provoked a new controversy this summer after announcing plans to sell subscriber names and phone numbers to telemarketers. When that trial balloon blew up in its face, AOL backed down from the lucrative scheme, but not without further tarnishing its already damaged reputation.

SINNER: Compaq Computer. Yes, the Houston, Texas, powerhouse is one of only two companies to have the dubious distinction of being both saint and sinner this year. The reason: Compaq's free fall in service and support. When *PC World* first began reporting results from ▶

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its Reliability and Service survey in 1994, Compaq's service was rated above average, and the company enjoyed one of the highest customer satisfaction ratings. But beginning about the time the company initiated its ill-fated pay-for-support plan on its Presario line, its service scores have been taking a nosedive. In our June 1997 report, the company had slid from its Best rating in March 1996 down to a Fair rating for service. Compaq has since decided to drop the fees, but only time will tell if customers will forgive the company.

SAINT: Compaq Computer. Though Compaq seems to be blowing it when it comes to providing service, at least the company is no longer charging hard cash to answer each and every one of those hardware and software questions that customers might have. After 18 months of billing Presario customers $35 every time they called in to Compaq's telephone support line, the company quietly rescinded the draconian fee last May. The elimination of the pay-as-you-go plan coincided with a complete overhaul of the company's service-and-support operation for its consumer line. Although we haven't yet seen the fruits of these efforts in the form of higher service marks, the changes are certainly a step in the right direction.

The Houston, Texas, powerhouse is one of two firms to have the dubious distinction of being both saint and sinner.

SAINTS: Girl Games, Girl Tech, The Learning Company, Mattel, and Purple Moon. These five companies (as well as a handful of other firms) earn a spot in the Saint category for their commitment to developing fun, high-quality computer games for girls. Although their new titles are as different as the preteen and teenage girl markets they're trying to reach, they're all to be lauded for recognizing that there's more to game playing than John Madden Football and Duke Nukem 3D.

SINNERS: Hewlett-Packard, Matsushita, NEC, Philips, and Sony. In a move that's sure to slow the adoption of rewritable DVD technology, these five companies have decided not to support the proposed industry standard for the reusable discs. Sony, HP, and Philips were the first to jump ship, claiming to have a superior technology. Days later, NEC followed suit. It's beginning to look like the Betamax-VHS wars all over again.

SINNER: Iomega. After enticing customers with a $50 mail-in rebate on its popular Zip drive, Iomega took months to process many of the coupons and was the subject of more complaints to *PCW Advocate* this year than any other hardware or software company. An Iomega spokesperson attributed the lengthy delays to the overwhelming customer response to the offer. A more cynical person might chalk it up to poor planning.

SINNER: McAfee Associates. Throughout the last half of 1996 and early 1997, the Santa Clara, California, developer of VirusScan engaged in public relations warfare against two of its main competitors. In September 1996, McAfee accused rival Symantec of overstating claims on its Norton Antivirus product. A few months later, McAfee unleashed its word processor against Dr Solomon's Anti-Virus Toolkit, alleging that the British developer had engineered its virus detection software to perform better (that is, catch more viruses) when the program was being evaluated by magazine reviewers. McAfee is no doubt convinced it's making the world a safer place for virus-wary computer users, but the mudslinging sounds like sour grapes to me.

SAINT: Microsoft. The company many of us love to hate earns high marks for its $150 million investment in Apple. Although the gesture is more symbolic than practical, it was an important component of Apple's overall reorganization plan. Certainly, Microsoft stands to gain from the deal: All Macintosh computers will now come bundled with Microsoft's Inter- ▶

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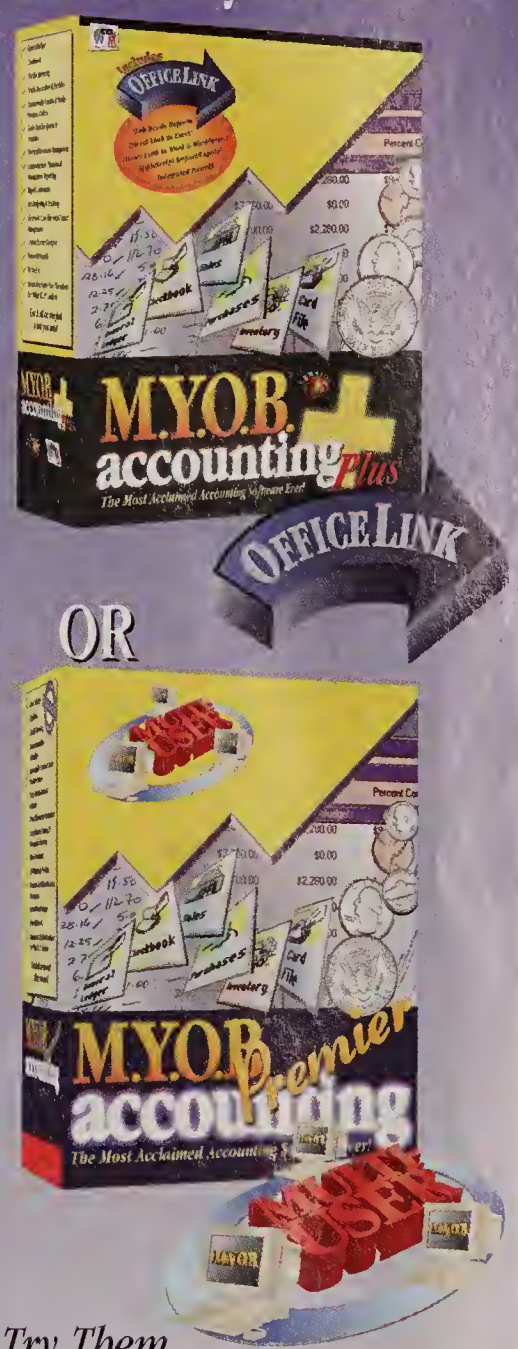

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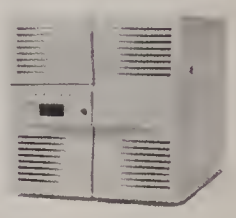

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net Explorer rather than Netscape's Communicator, and the software behemoth earns a tidy profit each year on its Macintosh software titles. Still, Bill Gates and company deserve some credit for helping to ensure that consumers have a choice in hardware platforms.

SINNER: Microsoft. Like Compaq, the Redmond, Washington, monolith earned a place of distinction in both the saint and sinner camps this year. The company's (biggest) sin: failing to provide Word 97 users with backward compatibility for Word files and making it difficult to locate files because of the .rtf extension instead of the standard .doc extension. Microsoft finally issued a patch in June—months after the initial release of the popular word processor.

SAINT: Netscape. Playing David to Microsoft's Goliath, Netscape has managed to hold its own in the browser war. With the release of Netscape Communicator 4 earlier this year, the company continued to raise the bar in browser features and ease of use, providing a real alternative to Microsoft's Internet Explorer. Unfortunately, it takes more than innovation to stay on top, and Microsoft's marketing and distribution prowess make for tough competition indeed.

SAINT: Quantex. When this small mail-order computer company first appeared in *PC World*'s Reliability and Service report in March 1996, it landed in the Poor category overall. Since then, the company has slowly worked its way up to Fair, earning particularly high marks for problem resolution and customer satisfaction. Also since then, the company's support has been on the rise. In fact, in this month's Top 20 system review, Quantex gets good ratings for both support quality and system reliability.

Have your say on any consumer issue. Send e-mail to consumerwatch@pcworld.com. Roberta Furger is a contributing editor for PC World. *Her first book,* Does Jane Compute? *is to be published by Warner Books in February 1998.* ■

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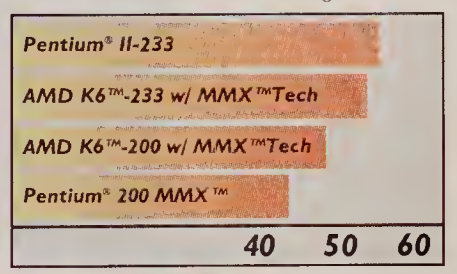

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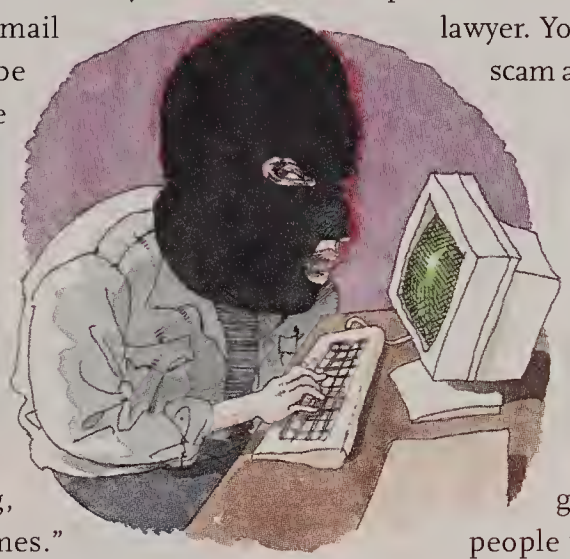
LG Electronics

The dark side of e-mail ◆ Watch your wallet ◆ Mail-order runaround

Spam Can Be a Lethal Weapon

IF YOU HAUNT newsgroups, you may have noticed the messages from Samsung Electronics America explaining a nasty situation the company is embroiled in. Or maybe you, like S. Tirtha of Bayville, New York, got a nasty e-mail that *appeared* to be from Samsung. The e-mail that Tirtha—and many other people—received looked like a cease-and-desist notice from Samsung's legal counsel. It accused Tirtha of hacking, flaming, and other Net "crimes." Many alarmed recipients hired lawyers.



The e-mails didn't actually come from anyone at Samsung; rather, they were sent by a disgruntled customer bent on harming the company. He sent an unknown (but huge) number of hostile messages mimicking Samsung's lawyer's e-mail address.

"We were the target of a ruthless terrorist attack," says Andrew Kritzer, senior manager of marketing communications at Samsung. He estimates the company gets 6000 to 10,000 angry e-mail messages a day about it and says the FBI is on the case. So if you get one of these e-mails, don't panic, lash out at Samsung, or hire a lawyer. You can read about the scam at www.samsung.com.

ILLUSTRATION: JOE CIARDELLO

INTERNET PICKPOCKETS?

A COUPLE OF letters alerted us to a site called Insiders Computer World (www.insiderscompworld.com) that offers great deals and gifts to people who pay a membership fee of $84.95. After you pay, you're supposed to get a catalog offering low dealer prices plus a nifty gadget. Both readers said the catalog came but the prices were not impressive and the prizes never arrived. So buyer beware.

A TIGER BY THE TAIL

JIM MARTENHOFF OF Port Charlotte, Florida, complained that TigerDirect, a mail-order PC firm, put him through the wringer and double-charged him. Oh, he got his order (a printer stand) on time, but it was missing one essential part. Tiger told Martenhoff to go to the manufacturer, but the manufacturer refused to help. Back to Tiger. This time Tiger told him to buy a second stand and return the original; they'd send him a new one and reimburse him for the first stand. This he tried to do. But Tiger's warehouse refused the return because it was incomplete, and Tiger refused to reimburse him what he was owed.

We contacted Tiger and spoke to Public Relations Specialist Janean Becker. She told us Martenhoff should have sent the product to Tiger's customer service in Miami. Tiger keeps only complete products on hand, not spare parts. Martenhoff did, however, get his money back. If you're returning a product without all its parts, check to see if it requires special handling.

DOWN BUT NOT OUT

KIT SANDERS OF Amarillo, Texas, accidentally dropped and broke his HP PhotoSmart digital camera. Expecting to lose his money due to his fumble thumbs, he called HP for a repair. To Sanders's delight, he got a new camera via UPS two days later, free of charge. HP even picked up the return postage on the broken camera.

TOO BAD: YOU OWN IT

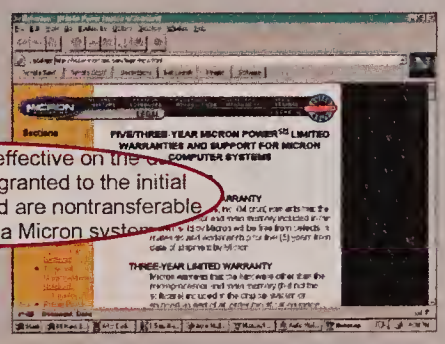
MARK WARD OF Woodbury, Minnesota, purchased a copy of IBM's Simply Speaking software at his local Best Buy store. Ward was unhappy with the product and tried to return it. No go. Best Buy will accept software returns only if you haven't opened the package. Once you open it, you keep it, unless the package is defective. According to Laurie Bauer, a spokesperson for Best Buy, the no-return software policy is necessary because of software piracy and viruses.

Think you've gotten a raw deal—or a great one? PCW Advocate *wants to hear the details at advocate@pcworld.com. We'll investigate complaints and publish items of the broadest interest. Christina Wood is a contributing editor for* PC World. ■

THE FINE PRINT

HARDWARE WARRANTIES: NOT ALWAYS TRANSFERABLE

DEEP IN THE LEGALESE of this Micron Electronics warranty is a word that might concern you if you plan to sell or donate your computer a few years down the road. Even though Micron offers a five-year (as well as a three-year) limited warranty on its systems, that warranty is nontransferable—it does not travel with the computer when you sell it. All Micron's warranties are valid only for the initial purchaser (Micron is reconsidering its policy). Policies vary from company to company, so if you're selling or donating your PC, and transferring the warranty is important to you, be sure to ask.



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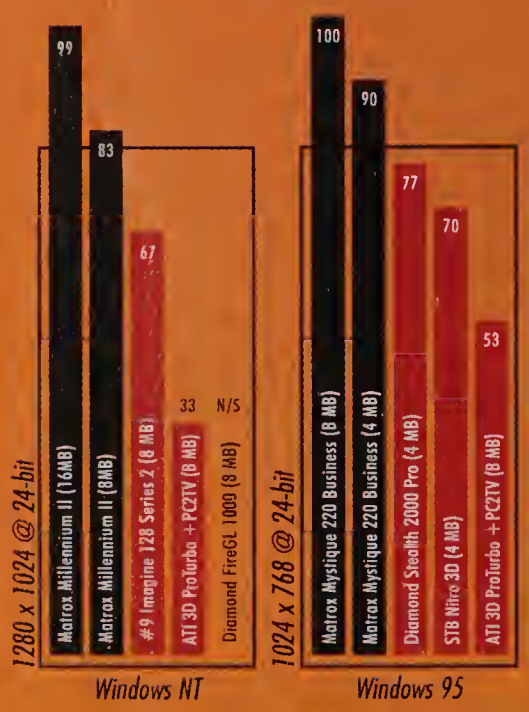

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* Estimated Street Prices. Windows 95 and NT tests conducted by Matrox Graphics Inc. on a Dell XPS H266 configured with an Intel Pentium® II 266 MHz processor with 512K cache and 32 MB of RAM. Matrox Millennium II, Matrox Mystique 220 Business, Number Nine Imagine 128 Series 2, ATI 3D ProTurbo + PC2TV, Diamond FireGL 1000, Diamond Stealth 2000 Pro, and STB Nitro 3D were configured with maximum memory configurations using driver revisions 3.20, 3.63, 4.102.03, 3.1.76, 2.70.4.0.27, 4.03.00.3211, and 1.52A respectively. WinBench 97 business tests conducted at 1280 x 1024 @24 bits at 75Hz vertical refresh using small fonts under Windows NT 4.0. Diamond FireGL is not supported at 1280x1024@24 bit. WinBench 97 business tests conducted at 1024 x 768 @ 24 bits at 75Hz vertical refresh using small fonts under Windows 95. All trademarks are the property of their respective owners.

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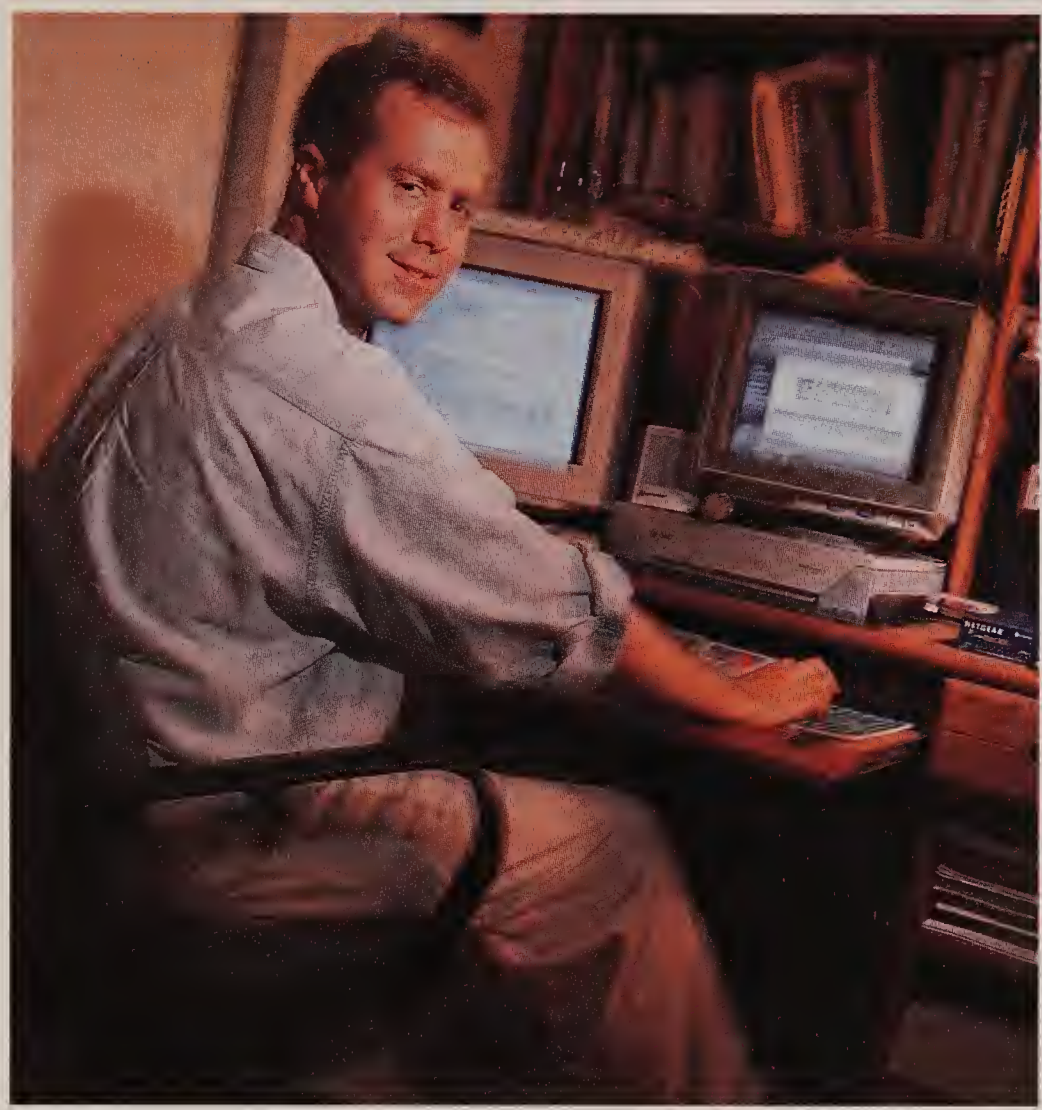
Networking Your Home Office

Working at home with PCs was Jim Novack's first step in launching his business. Now his growing company has moved to the next phase: networking at home.



PHOTOGRAPH: ANDY FREEBERG

THE PROBLEM Jim Novack, a self-employed Internet consultant and software developer in Larkspur, California, uses four computers to meet the demands of his growing business. Three machines reside in a spare bedroom that Novack converted into a home office; the fourth lives in his main bedroom. But that last PC was an orphan, with no easy way to share files or peripherals with its cousins next door. Novack tried the sneakernet for a while, then hit upon a better idea: Why not install an ethernet network? —*Editor*

A few months ago my home-based business was putting me in a pinch—literally.

I needed a lot of equipment to support my business. In a spare bedroom that I converted to a home office, I'd set up a desktop PC, a notebook, and a Sun SPARC server (for Web site testing), along with a scanner, a laser printer, a tape backup drive, a modem, a fax machine, and so on. The room is only 100 square feet, so it was a tight squeeze—particularly when my wife needed to use one of the computers.

Because of the cramped conditions, I set up a fourth computer in our main bedroom. That eased the overcrowding but didn't solve my biggest problem: There wasn't any room to attach printers or backup drives to all my PCs, and the cost of buying separate peripherals for each machine was too high. When I needed to print a file located on a PC that didn't have a printer attached, I'd have to do the sneakernet routine. And backing up all my computers was a hassle; frequently I'd just back up whichever machine the tape drive was attached to.

Also, my wife and I keep our schedules and contacts in a personal information manager on the bedroom PC. Going from one room to another to get a phone number was a pain, and I didn't want to copy the PIM database to a second computer and end up with two different versions of the same database.

THE SOLUTION: INSTALL AN ETHERNET NETWORK

I HAD ONLY TWO OPTIONS: Either live with the situation, or wire the place with a network. The first was almost unbearable, the second merely frightening. Networking all my computers seemed a huge undertaking. Then a friend suggested I check out the affordable networking products designed especially for small and home offices.

Because I work with large graphics files and will probably expand my network to handle video and multimedia apps, I decided to get an eight-port ethernet switch. I settled on Netgear's SW 510, a $995 ethernet switch with eight 10-megabits-per-second ports and two ports that support speeds of up to 100 mbps. For most home offices, though, an ethernet switch is overkill. If you simply want to share peripherals and standard files between a handful of PCs, all you really need is a low-cost network starter kit, which includes all the network adapters and cables you need. You just have to hook up ▶

the cables between your computers and the ethernet hub, install the network adapters, and configure your machines to be network-ready. And it's all a lot easier than you might think. [For example, Netgear's SB104 Network Starter Kit includes a four-port ethernet hub, two 10/100-mbps PCI adapter cards, and two ethernet cables for $179. For more details, see "The Do-It-Yourself Network" in this issue. —*Editor*]

Before installing my network, I studied the Netgear manual. It was easy to follow and understand, with diagrams showing how to lay the network cabling and connect the devices to the ethernet switch. Next, I drew a diagram of my network configuration and made a shopping list of the equipment I'd need. For the physical wiring strung between the two rooms, I needed 100 feet of category-five, four-twisted-pair cabling. And because this is our home, I didn't want to look at ugly, exposed wiring, so I added to the list white plastic conduits—tubing with a self-adhesive back that disguises the wiring and secures it to the wall. I bought both the cabling and tubing at Home Depot.

I would also need two network adapter cards (the Sun SPARC server has a built-in ethernet port, and my Compaq desktop already had a network card). To complete the wiring, I needed two faceplates to accommodate the wiring's modular jacks, and two surface-mounting boxes—empty plastic containers that secure to the wall. These parts are available at electronics stores like RadioShack. Finally, I needed ethernet cables, which connect at one end to the network adapters and ports in each machine and, at the other end, to the Netgear SW 510 ethernet switch.

Once I had the equipment, I drilled holes in the office and bedroom ceilings and strung the four-pair wiring between the two rooms by way of the attic. (Now I know how Bruce Willis felt in *Die Hard.*) Then I laid the individual wires into the backs of the modular jacks. I snapped the jacks into the faceplates, attached the faceplates to the mounting boxes, and secured each box to the wall.

> Networking my PCs seemed a huge undertaking. Then a friend suggested I check out products for small and home offices.

Configuring my systems to run on an ethernet network was a snap. My Compaq 386 desktop still runs Windows for Workgroups, so I had to install Windows for Workgroups' network option, which took just a few minutes. For my PS/2 desktop and ThinkPad notebook, I simply configured the network client in Windows 95's Control Panel. The Netgear manual explained how to do both configurations, but the process was so simple I never had to refer to the guide.

All told, it took almost a full day to get my network up and running. Installing wiring between rooms is as easy as hooking up a telephone extension jack. And if you've ever installed a memory card, you can handle a network card. You can also buy a PC with a network card already installed. Many Dell systems, for instance, now come with 3Com ethernet cards installed.

The bottom line? If you're running a home-based business that's growing, at some point you'll probably need a network. Installing one between two rooms is not, in the end, a big deal—I wish I'd done it sooner. Being networked has saved me a lot of time and money. My work setup is more comfortable now. And as relatively simple as installing a network is, I may never have to do it again: We're considering moving to a new housing development—one in which the homes will already be wired for networks.

Edited by James A. Martin

Netgear SW 510

$995 list; SB104 Network Starter Kit $179 list; Netgear; 800/822-9638; netgear.baynetworks.com

READER SERVICE NO. 732

James A. Martin is a PC World *contributing editor. If you've solved a problem in your business using a particular PC application or hardware device, we'd like to hear about it. We pay $300 for published columns. See page 14 for contact information.* ■

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the art *and* science *of* imaging

Olympus blends the two to create a fresh new vision

Though you've been *wanting* the many conveniences of digital photography, you've been holding off for one reason or another. Now the waiting is over.

Whether you postponed a purchase because of the high cost of digital cameras and printers, or you required higher image resolution and color accuracy than affordable digital cameras could provide, Olympus has good news for you.

From the economical, feature-rich D-220L and D-320L to the exciting D-500L and D-600L digital cameras, plus the ES-10 film scanner, P-300 Personal Photo Printer and SYS.640 Personal Storage System, Olympus puts a digital darkroom within everyone's reach.

With the addition of the D-500L and D-600L SLR digital cameras to its comprehensive suite of digital imaging equipment, Olympus continues to outdistance its competition. Designed for anyone whose projects demand no-compromise quality, both ergonomic cameras feature 3X zoom lenses, unprecedented resolution (up to 1,280 x 1,024 with the D-600L) and accurate through-the-lens viewing.

The 640 x 480 resolution D-220L and 1,024 x 768 D-320L cameras include an abundance of features, including video-out capabilities that enable family or business groups to view photos on a TV directly from the camera. Images can also be transferred to videotape.

the art *and* science *of* imaging

If a snapshot can enhance the moment or the message, Olympus has the solution

D-600L HIGH-DEFINITION LCD SCREEN

Both the D-220L and D-320L weigh in at a mere 9 ounces, including a large 2-inch, active-matrix LCD viewing screen. For precise image brightness, both cameras can bracket snapshots one full step, and their stop-action mode can take up to nine shots per second in a single frame. A four-mode flash with automatic operation in low light and back light, "red-eye reduction," fill-in flash and flash off modes lets you shoot under almost any condition.

The D-220L and D320L sell for street prices of $499 and $699, respectively. The D-500L sells for $899 with an 850,000-pixel progressive scan CCD (1,024 x 768 resolution). The D-600L, with its astounding 1.4-million pixel progressive scan CCD sensor, sells for an equally astounding $1,299.

Zoomin' in

Tired of hovering over your subject for a close up? Zoom lenses, for more than 20 years an essential feature in film cameras, are available in the D-500L and D-600L cameras. The 9.2mm to 28mm zoom provides focal lengths the equivalent (in 35mm format) of 50mm to 150mm on the D-500L and 36mm to 110mm on the D-600L. This means serious photographers who require precise control over an image can take wide-angle shots or telephoto close-ups, just as they would with a conventional zoom lens.

For those whose photo sessions don't require as much flexibility, the 5mm f2.8 lens (equivalent of 36mm) in the D-220L and D-320L will effortlessly meet your needs. Just point and shoot and let the camera do the rest. Full automatic operation – including auto focus – makes it easy.

All cameras use the SmartMedia™ removable flash memory cards. That means you can take as many images as you want. Each postage stamp-sized 2-, 4- or 8-megabyte card holds an amazing number of images and is reusable, with 16-megabyte cards available soon. Cards slip out of the camera's back and into either a PCMCIA card or a 3.5-inch floppy-sized adapter for uploading to your laptop or desktop.

Capture, share and store

Analysts and customers have plenty to say about Olympus' unique and innovative approach to digital imaging. According to Kristy Holch, principal of InfoTrends Research in Kansas City, Kan.: "With their long experience in optics and imaging technology, the Olympus camera's multi-element aspherical lens delivers excellent image quality at a very affordable price."

No matter what you intend to photograph, there is an Olympus camera that will meet your needs. Do you want to capture and share images during social gatherings, as does youth pastor Rev. Bill Winton of Waxhaw, N.C.?

"We take lots of pictures with our Olympus digital cameras during our events, [then] transfer them to the computer and arrange them in a slide show. The students think it's awesome!"

Or perhaps you have real estate or some other product for sale and want to increase the impact of your ads? Product snapshots for sales presentations or for your Web site could drive up sales by helping

D-320L WITH REMOVABLE SMARTMEDIA CARD

"OLYMPUS...DELIVERS EXCELLENT IMAGE QUALITY AT A VERY AFFORDABLE PRICE."
Kristy Holch, InfoTrends Research

customers better visualize your merchandise, as was the case for Joseph Lanza, principal of Sign DeSign and JC Awning in Port Chester, N.Y. Lanza's company superimposes photos of their awnings, for instance, on snapshots of prospective customers' buildings.

"This camera has already paid for itself 50 times over by consistently getting me new projects – thanks to impressive presentations," says Mr. Lanza, "and all while saving my company up to $1,500 a year in film and developing costs. It has helped produce in-house literature, sales presentation materials and the company Web site."

Perhaps, instead, you want photos of your employees to annotate their personnel records and IDs. Whatever your needs, if you want a snapshot and want it *now*, Olympus has good news for you.

No computer? No problem!

Already the recipient of more than 30 industry awards (just in 1997) – more than any other imaging products company – Olympus continues its innovative record. Imagine a printer that prints directly from the camera (without the need for a computer) at a price of just $399.

If you're primarily interested in "point, shoot and print," the P-300 Personal Photo Printer makes it happen. Just plug any Olympus digital camera directly into the P-300 and you get a 4 x 5.5-inch, photo-quality, full-color print in as little as 95 seconds.

P-300 Personal Photo Printer

Weighing only 5.5 pounds, this 300dpi printer packs heavyweight features into a compact 11 x 10-inch footprint. Finding this much capability in a dye sublimation, photo-quality printer selling for $399 is indeed noteworthy. To get the same smooth blends of consistent color from an ink-jet printer requires 2,400dpi resolution. You can control the printer directly from any Olympus camera simply by plugging the camera into the P-300.

The P-300 offers three output options: high-gloss photo paper; a peel-and-stick photo label; or 16 per page, miniature self-stick photo labels. You can also generate up to 30 reprints of the same image automatically with the D-220L and D-320L cameras.

"This is a complete photo mini-lab. What one-hour photo labs did for the film industry in the early '80s, the P-300 does for the digital camera industry in 1997," says David Veilleux, director of marketing for digital products at Olympus.

> "This camera has already paid for itself 50 times over by consistently getting me new projects."
>
> *Joseph Lanza, Sign DeSign and JC Awning*

Doing more with your image

And Olympus does not stop there. Its economical ES-10 film scanner converts your existing 35mm slides or negatives into digital images. Priced at $449, the single-pass scanner has a dynamic range equal to 30-bit scanners. The ES-10's optional adapter lets you drop in Advanced Photo System (APS) film cartridges for scanning into a digital format.

ES-10 Film Scanner

To safeguard your valuable images, you can store them on the new Olympus SYS.640™ Personal Storage System. The external unit connects to a Macintosh® (via SCSI) or to a PC (via its parallel port for easy installation and portability or via a SCSI card for higher speed throughput). Unlike other mass storage products – which use magnetic media and have an average life of five to seven years if not refreshed – the SYS.640 uses optical technology, so your images will stay intact for decades. Cost per megabyte of storage is much more economical on SYS.DISK™ media as well.

SYS.640 Personal Storage System

Software for fun...and profit

If you're interested in image editing and special effects, you're in luck, because each camera plus the P-300 printer and ES-10 scanner come bundled with photo editing software, slide show presentation software and several utilities for downloading images from the camera to your choice of data storage.

Olympus has combined 78 years of photographic experience and technology development to create a vision of the future of digital imaging. With its new line of integrated products, the company meets the needs of everyone who wants superior quality, innovation and affordability in digital imaging. Whatever your photographic interest, Olympus has good news for you. ◘

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K6 kontroversy ◆ Clunking Caviar drives ◆ PCCrypto cautions

K6 Bug Plagues Propellerheads Only

IS YOUR NEW Advanced Micro Devices K6 processor buggy? AMD released an errata sheet describing math errors in early versions of the K6 (www.amd.com/K6/k6docs/pdf/21266e.pdf). But so far, the only real-world problem the error causes is that Linux users can't compile the OS's source code using the gcc compiler on PCs with more than 32MB of RAM. Why, it's enough to melt your shirt-pocket protector.

An AMD source says that the K6 chip itself is not flawed, that errata are normal in microprocessors, and that the problem will be fixed in upcoming versions. AMD will also replace K6 chips for users who encounter errors and call its tech support line (408/749-3060). Still have doubts? Check the page titled "A Weird K6 Bug" at www.chorus.com/~poulot/k6bug.html for independent bug reports and scuttlebutt.

Intel and Cyrix CPUs aren't immune from errors, either. In particular, Pentium Pro and Pentium II owners should check out www.intel.com/design/news/flag/. For the best information on Cyrix processors, see Bryan Davis's encyclopedic Cyrix 6x86MX Upgrade Advice Guide at www.alternativecpu.com.

WESTERN DIGITAL QUIETS CLUNKING DRIVES

BUG Does your Western Digital Caviar drive make a clunking sound? The company says several of its drives in the 1.2GB-to-5.1GB size range contain a firmware error that causes the read head to travel too close to the parking magnet when the drive is idle. The resulting noise is irritating but nonlethal (see www.wdc.com/quality/reduce-noise.html for details).

FIX Just download a free 121K patch from www.wdc.com/quality/noise-util.html and read the instructions on that page.

Bugs are inevitable, and it's great when companies provide free fixes in a timely fashion. But companies need to take customers' problems seriously. Caviar owners who had posted queries about the problem on Western Digital's new Web-based discussion forum (www1.wdc.com/support/wwwboards/eide_ide/welcome.html) found their messages deleted, with no response awaiting them. One Caviar owner even received a written threat that unless he stopped posting "negative attacks" on the company, it would ask the Internet service provider to cancel his account. A Western Digital source said the company would clarify what it considers an unacceptable posting. Since the episode, the forum appears to be more tolerant of critical posts.

PCCRYPTO 2.1: NO STRENGTH IN NUMBERS

WHEN YOU USE an encryption program to secure your files, you expect the password you enter to be the only one that works to decrypt your sensitive data. That's not always the case, as *Bugs and Fixes* reader Steve Blackwell discovered. After downloading and installing the PCCrypto 2.1 upgrade from McAfee Associates' Web site (www.mcafee.com/prod/security/pccdatas.asp), Blackwell encrypted a file using 56-bit DES encryption and the password '123123123'—not a great password, admittedly. When he went to decrypt the file, he typed the password incorrectly but found that PCCrypto decrypted the file anyway. Further investigation revealed that quite a few variations on the original password worked, including '123123', '123123122', and even '122'.

McAfee says this strange behavior is simply a consequence of using weak passwords that contain a limited number of repeating characters. However, Blackwell reports that PCCrypto 1.0 doesn't exhibit the problem. A company source says the upcoming version 2.2 will prevent you from creating passwords that are too weak to ensure unique decryption. The new version will also fix a bug that overwrites the program's encryption log file. Until a fix appears, McAfee suggests this work-around: Don't click the Close button in the log file window; instead, save the file using the dialog box that appears when you exit PCCrypto.

Files from this article are available on PC World Online (www.pcworld.com/files). Scott Spanbauer is a senior associate editor for PC World. *To contact him, see page 14.* ■

IN BRIEF

RegClean Out for Repairs

CAN'T FIND MICROSOFT'S free RegClean 4.1? That's because the company has temporarily removed the utility, which helps you tidy up the Windows 95 Registry, from its FTP directory (ftp://ftp.microsoft.com/Softlib/MSLFILES/) to fix a few bugs. See www.microsoft.com/kb/articles/Q147/7/69.htm for the latest scoop on RegClean.

PartitionMagic 3.04

VERSION 3.01, 3.02, 3.03—PowerQuest should go into the browser business. The latest update of its popular disk utility, available at www.powerquest.com/download/update3.html, incorporates previous bug fixes and adds tools, tweaks, and features, including a new utility for moving applications from one partition to another.

BUGGED?

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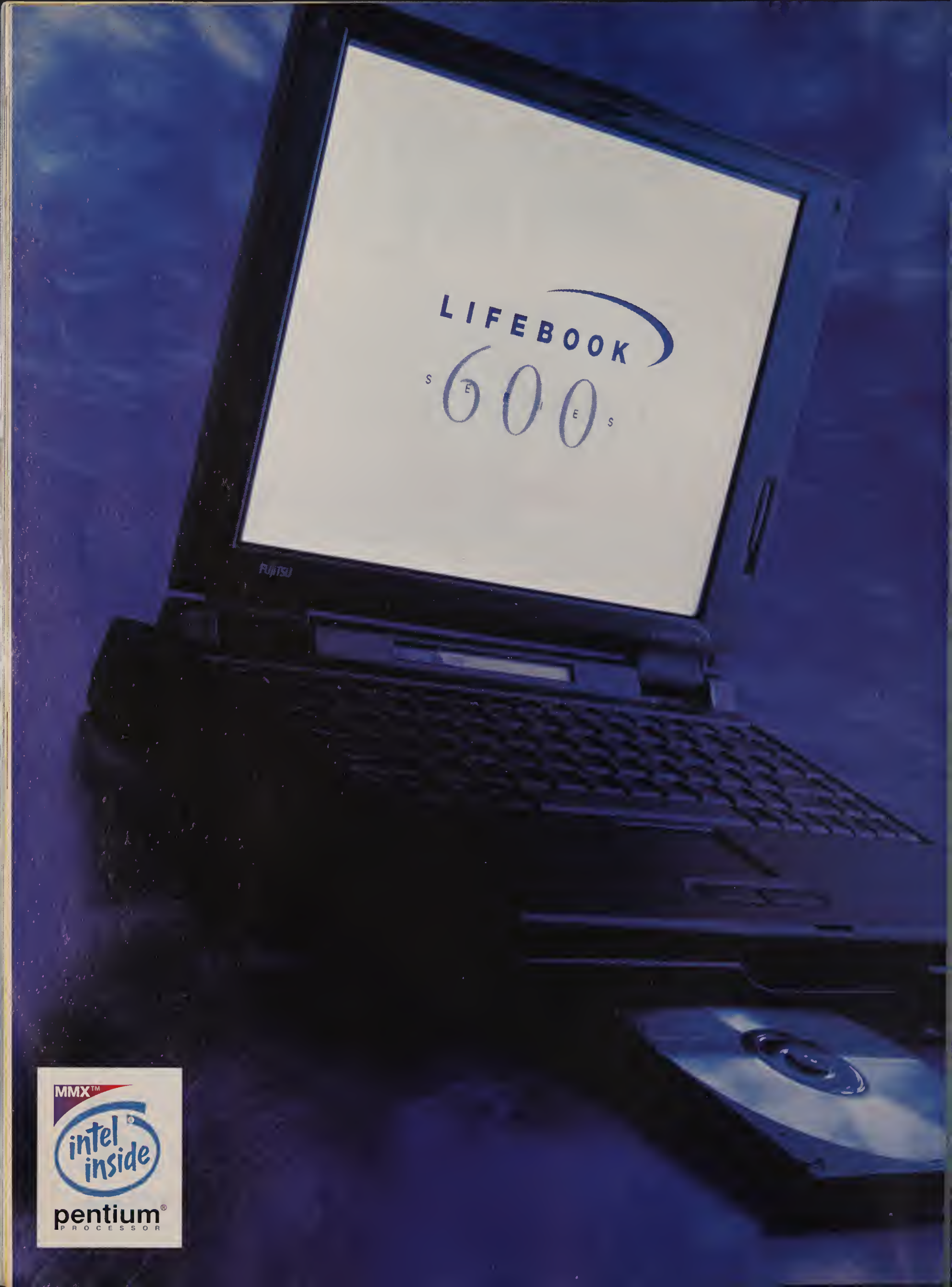
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TOP OF THE NEWS

NT 5.0

A Windows Worth Waiting For?

EVEN UNDER IDEAL circumstances, deciding whether to upgrade to the next version of Windows involves some nail biting, hand wringing, and risk. But with two new versions on the horizon, the choice could be more nerve-racking than placing your bet at a high-stakes poker game.

As Microsoft puts the finishing touches on Windows 98, it also will push to complete Windows NT Workstation 5.0, the next version of the desktop operating system geared toward corporations and power users.

MANY UNKNOWNS

SO IF YOU'RE contemplating an upgrade, will Windows NT 5.0 be a smarter move than Windows 98? The first NT 5.0 beta, which we evaluated for this article, is in too rough a state for us to make any firm conclusions. Many planned features weren't ready. We couldn't test the beta for such vital issues as performance and stability. And pricing and hardware requirements had not been set.

NT has historically commanded a premium price: Version 4.0 sells for $319, $145 for the upgrade, versus $209 for Windows 95, with a $109 upgrade.

Here's what we do know. With the Internet Explorer 4.0 interface, the new version looks almost exactly like Windows 98, so opting for NT won't mean sacrificing any Win 98 interface innovations that appeal to you. Because it's NT, the product offers far more features than Win 98 for protecting data from snooping eyes and unstable applications. NT 5.0 promises to address some of Windows NT 4.0's shortcomings, such as its lack of support for Plug and Play and power management, a necessity for notebooks.

However, NT 5.0 won't be the version that unites all Windows users into one big compatible family. The OS will not support as wide a range of software and hardware—particularly older products—as Windows 98. Assuming your PC is up to the task of running either Windows 98 or NT 5.0, the choice may ultimately depend on which you value more: Win 98's near-universal compatibility or NT 5.0's emphasis on secure, reliable operation.

GETTING UP AND RUNNING

WE TESTED BETA 1 of Windows NT Workstation 5.0, a rough draft of the new OS. Though hardware requirements for the finished product were undetermined at press time, users with older PCs will likely need to invest in hardware upgrades or even a whole new PC. We found run- ▶

EDITED BY
Charles Piller, Randy Ross, and Bill Snyder

Microsoft's **powerhouse OS** will graft the look of Windows 98 to its **stable** and **secure** core. But major hardware and **software compatibility** frustrations linger.

ILLUSTRATION: OTTO STEININGER; ICON: JEFFREY PELLO

JUST IN

Feds to Microsoft: Knock It Off

THE U.S. DEPARTMENT of Justice wants Microsoft to change its Internet Explorer marketing practices—or face fines of up to $1 million per day. Justice Department officials accused Microsoft of using its Windows monopoly to "undermine consumer choice" by requiring PC vendors to bundle the Web browser with their hardware to get a Windows 95 license. Also, officials want Microsoft to inform consumers that they don't have to use Internet Explorer as their Web browser—and to provide instructions for removing the IE icon from the Windows 95 desktop. Microsoft spokesperson Mark Murray said the company is operating in an appropriate and lawful manner. At press time Microsoft had 11 days to respond to the Justice Department's requests, at which time a federal judge was to decide whether or not to move forward with the case.

CPUs Beyond 300 MHz

HERE'S A SCORECARD for chip offerings in the near future. First, the challengers: By mid-1998, Advanced Micro Devices plans to introduce a K6 3D that runs at speeds from 300 to 350 MHz. Later in the year, you ▶

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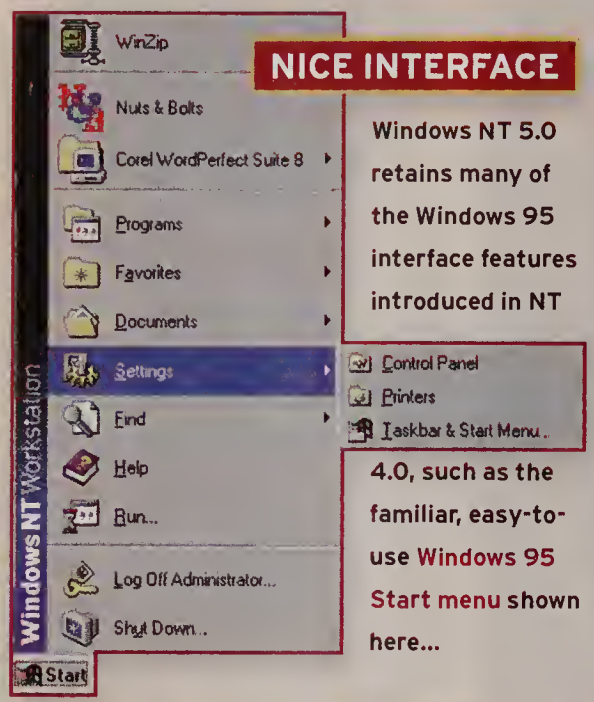
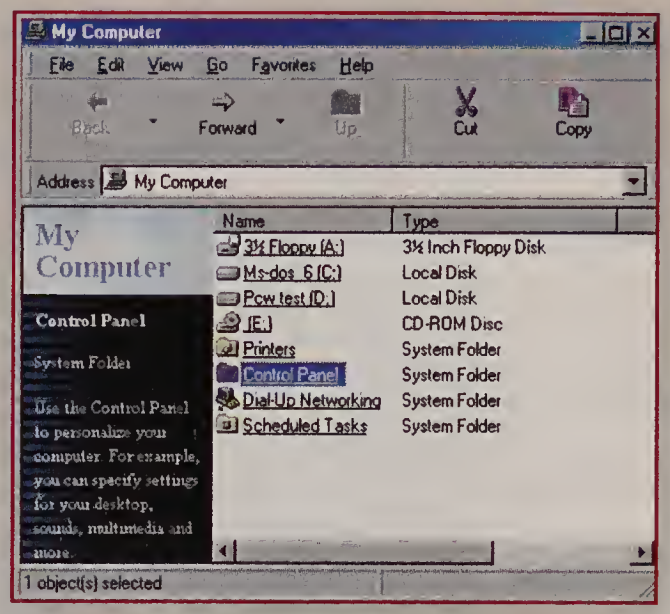
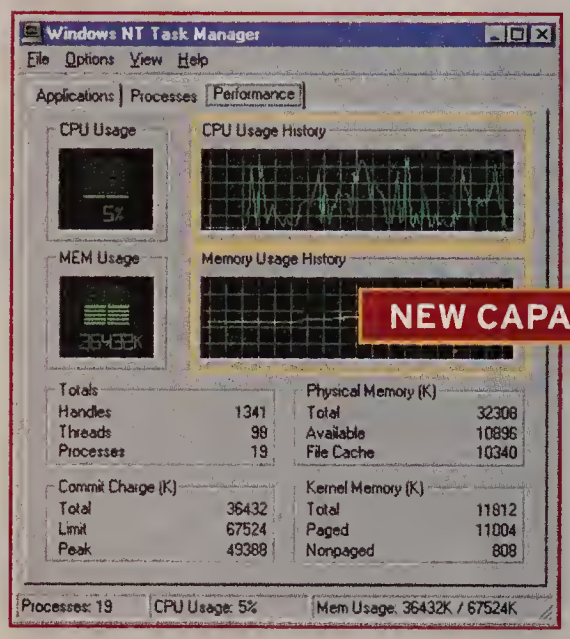
NT Closes In on Windows 98



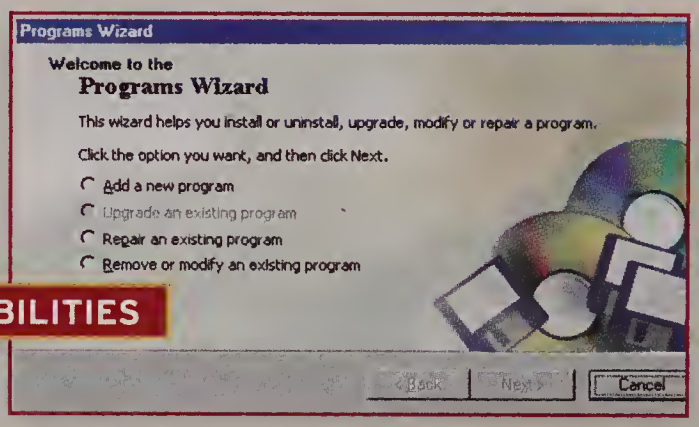
Windows NT 5.0 retains many of the Windows 95 interface features introduced in NT 4.0, such as the familiar, easy-to-use Windows 95 Start menu shown here...



...and adds Windows 98's browserlike interface option for viewing system resources, such as drives.



NT 5.0 will provide new features that likely won't make it into Windows 98. The beefed-up Task Manager now monitors CPU usage, available memory, and other information of interest to power users.



Another addition, a more powerful Programs Wizard, is expected to repair software and more thoroughly uninstall it, and replaces the Add/Remove Programs feature found in NT 4.0, Windows 95, and Windows 98.

ning the beta on a 75-MHz Pentium with 32MB of RAM a little on the slow side, though the shipping version of the OS will likely be faster. Still, you'll probably want to run NT 5.0 on at least a high-end Pentium system with 32MB of RAM. Some analysts recommend a considerably beefier machine: You may be dissatisfied with anything less than a Pentium Pro or Pentium II system with 32MB of RAM, says Dwight Davis, editorial director at the *Windows Watcher* newsletter.

Beyond performance issues, NT 5.0 should be easier to install than its predecessor, NT 4.0. One big improvement was apparent the moment we began to set up the OS: We were able to install NT 5.0 over Windows 95, retaining the existing Start menu setup, desktop settings, and other configuration details. (The best you could do with NT 4.0 was to install it alongside Win 95 and then reinstall all your applications in NT.) Microsoft says that by the time NT 5.0 ships, you'll be able to install it over Windows 3.x, Windows 95, or Windows 98, as well as from scratch on a new system.

MORE WIZARDRY

ANOTHER NEW addition, the setup wizard, examines your system and warns you of drivers and applications that might not work properly with NT 5.0. When we tried to install the OS on a new Dell Dimension 200-MHz Pentium MMX system, the wizard produced such a lengthy list of potential problems (including some with the motherboard and sound card), we decided to try another system. We put NT 5.0 on an older Dell Pentium-75 PC, where the wizard reported no major problems.

Like its predecessor, NT 5.0 will come with a lengthy Hardware Compatibility List of systems Microsoft has tested it with successfully; installing it on a PC that's not on the list can be a dicey proposition. According to Microsoft, the problems we encountered trying to install it on the Dell PMMX-200 system may be resolved before the OS ships.

NT AND 98: SEPARATED AT BIRTH?

THE MOST obvious change in the new NT is its interface. The beta of Windows NT 5.0 looked nearly identical to early versions of Windows 98 we've seen. Like Windows 98, NT 5.0 will come with Internet Explorer 4.0 built-in, and will let you choose between a standard Windows 95 desktop and a Web-like interface that supports single-clicking and browser-style navigation of your hard disk, Control Panel, and other items. It's the same look and feel that Windows 95 users can get today for free by downloading and installing Internet Explorer 4.0.

Like Windows 98, NT 5.0 is expected to support Universal Serial Bus and IEEE 1394 (FireWire) peripherals that have NT 5.0 drivers, as well as the DirectX standards for high-powered games and multimedia titles. Microsoft also plans to add some of the slicker Windows 98 features, such as support for multiple monitors and Broadcast Architecture, a feature for TV tuner–equipped

PCs that will provide detailed television listings in addition to the ability to download data that's embedded in cable TV signals. In the beta version that we examined, none of these features were functioning yet.

Indeed, the goal is to put virtually every Windows 98 feature into Windows NT 5.0—but not vice versa. Like its predecessor, NT 5.0 stresses safety and security in a way that Windows 3.*x* and 95 never have. Windows 98's password protection remains toothless, but NT 5.0 (like earlier versions of NT) will include User Manager, a utility that lets you set up password-protected profiles for multiple users, giving them varying levels of access to the PC and network. The NT File System will add even more security-minded features in version 5.0, including the ability to encrypt files and directories. You'll need to convert your hard disk to NTFS 5.0 to get all of NT's features, but the OS will also be able to reside on disks formatted with the FAT and FAT32 file systems used by Win 95 and 98—important if you're planning to dual-boot your PC between multiple versions of Windows, as we did in our tests with the NT 5.0 beta.

The beta also includes a very preliminary version of a revamped Add/Remove Programs Wizard. Unlike the wizards in Windows 95 and 98, which merely pass control to the installation programs in the application you're trying to install, NT 5.0 manages the process and actually copies the new software and configures it. As a result, the OS knows precisely which changes were made to your computer.

This method has several potential benefits, including tidier uninstalls that remove all detritus, simpler software upgrades, and the ability for the operating system to repair corrupt software installations. Software packages will have to be designed to take advantage of this new approach to software installation, which may also make its way into Windows 98. The design was not fully functional in the Windows NT 5.0 beta that we examined for this story. ▶

A new **Programs Wizard** in NT 5.0 could simplify upgrades and uninstall software **better than** its predecessor.

Windows Face-Off: NT Versus 95 Versus 98

THE VERSIONS OF Windows present and future have many similarities—and a few key differences. Windows NT Workstation 5.0's precise feature set remains in flux (as does Windows 98's, to a lesser degree). Here's a comparison based on Microsoft's current plans.

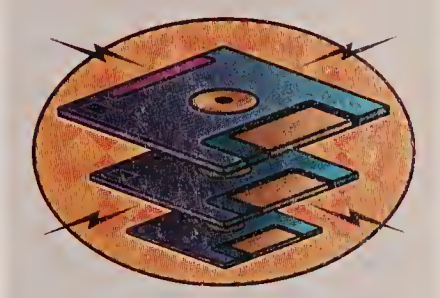
PRODUCT COMPARISON

FEATURES	Windows 95 OSR2 [1]	Windows 98	Windows NT Workstation 4.0	Windows NT Workstation 5.0
The Basics				
Internet Explorer 4.0/desktop-Web integration	downloadable	included	downloadable	included
File System				
File systems supported	FAT, FAT32	FAT, FAT32	FAT, NTFS 4.0	FAT, FAT32, NTFS 4.0, NTFS 5.0
File- and directory-level password protection	○	○	●	●
File and directory encryption	○	○	○	●
Hardware Support				
Plug and Play	●	●	○	● [2]
Universal Serial Bus	● [3]	●	○	● [2]
Drivers for DVD, AGP, and IEEE 1394 (FireWire)	○	●	○	● [2]
Multiple displays	○	●	○	●
Broadcast Architecture for TV tuner-equipped PCs	○	●	○	●
Power management	APM	APM, ACPI	none	ACPI, limited support for APM

● = Yes ○ = No

[1] Version shipping on new PCs. [2] Requires NT 5.0-compatible driver. [3] Not available for original version of Windows 95.

can expect to see AMD's K6 3D+ running from 350 to 400 MHz, as well as a comparable chip from Cyrix that's a successor to its current 6x86MX. By mid-1998, expect Intel to ship a 333-MHz Pentium II CPU, the first PII of a series code-named Deschutes. This Pentium II-333 will run on a 66-MHz system bus. Later versions, possibly running at 350 and 400 MHz, will run on a 100-MHz system bus. Deschutes processors will be the first low-power Pentium IIs that can operate in notebooks as well as in desktops. Later Intel is expected to introduce CPUs with additional MMX instructions. In 1999, Intel should be ready to ship a 600- to 800-MHz chip, code-named Merced, that's aimed at high-end workstations and high-end servers.



200MB Floppy Disk

SONY AND FUJI have announced the HiFD drive, which reads and writes to old 3.5-inch floppies as well as to new 200MB disks. The two firms hope to convince PC makers to include the HiFD in new systems next year, says Fuji spokesperson Jeff Ash. The HiFD drives offer higher performance and about twice the storage of two competing high-capacity floppy drives, Iomega's Zip Drive and OR Technology's LS-120, says Jim Hamilton, an analyst with Freeman Associates. Pricing for the HiFD devices was not available. "For this technology to be ubiquitous, they're going to need to get it below $50," says Hamilton. ▶

Win NT Offers Mixed Blessings

BASED ON MICROSOFT'S current plans and our first look at an early beta version, Windows NT Workstation 5.0 may be a smoother upgrade for current Windows users than version 4.0 was. But many potential pitfalls remain.

POWER AND ITS TRADE-OFFS

NT'S UNDERLYING architecture, which will not change much with this release, is designed to provide a more stable, less crash-prone environment than that of Windows 98. While Win 98 retains vestiges of DOS and Windows 3.1 under the surface, NT has always been a fully 32-bit operating system from the ground up. Applications are shielded from one another in separate memory chunks and must address the display, disk, and other components through the OS's official procedures rather than doing so directly, as is still possible in Windows 98.

These measures greatly reduce the chances of an errant application or device driver crashing other programs or bringing the system down altogether. Unfortunately, they also reduce NT's software and hardware compatibility. Specifically, NT can't use old 16-bit drivers, as Windows 98 can. Also, programs that try to take direct control of the PC are unlikely to work. Prime offenders include many utilities, games, and old terminate-and-stay-resident DOS programs; the only way to be certain that a given package will function with NT is to check with the vendor or try it yourself. Microsoft has no plans to improve this for NT 5.0.

To be sure, the news about Windows NT 5.0 software compatibility isn't all bad. In our informal tests, every program that was designed to work with Windows NT 4.0 ran with the NT 5.0 beta, and more NT 4.0–compatible programs are becoming available every day. That represents a substantial change from the status a little over a year ago when we originally tested Windows NT Workstation 4.0. At that time, the current versions of some major business packages such as Lotus SmartSuite and WordPerfect Suite would not even install under it. (The companies fixed this problem after NT 4.0 shipped.)

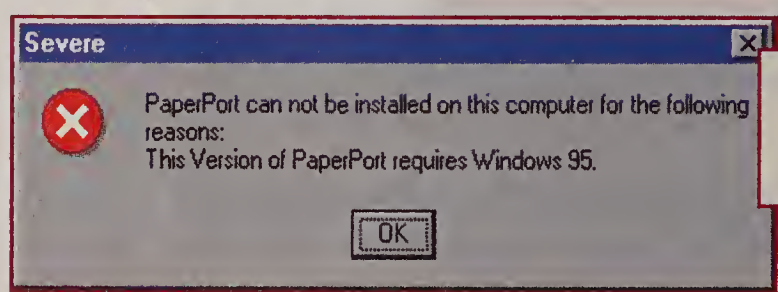
Likewise, Microsoft will attempt to address some hardware compatibility issues. The vendor claims that Windows NT 5.0 will add support for Plug and Play that's essentially identical to that of Windows 98. But even if Plug and Play identifies a peripheral, that doesn't mean you'll be able to get it up and running. You'll still need a driver that's designed to run under NT.

MIGRATION ISSUES...

The good news	The bad news
• NT 5.0 can be installed over any previous version of Windows.	• It will still have heftier system requirements than Win 95 (not to mention Win 3.1). • Installing it on a PC that's not on the NT Hardware Compatibility List is a gamble.
• Unlike NT 4.0, NT 5.0 can reside on a disk formatted with Win 95 OSR2's FAT32 file system.	• It may not be compatible with DriveSpace disk compression. • Some features (such as encryption) require you to convert your disk to the new, incompatible NTFS 5.0 file system.

HARDWARE COMPATIBILITY...

The good news	The bad news
• NT 5.0 adds power management for notebooks.	• Only new notebooks that support ACPI will be able to take full advantage of power management.
• NT 5.0 supports Plug and Play.	• Plug and Play won't work if a peripheral doesn't have an NT driver. • NT drivers for entire product classes (scanners, low-end printers) are scarce today.
• Win32 Driver Model drivers will work with both Win 98 and Win NT.	• Many peripherals won't have WDM drivers. • WDM won't work at all for video cards or printers.



HARDWARE HEADACHES: Visioneer's PaperPort Strobe, a sheet-fed color scanner, is one of the myriad devices that don't currently support NT.

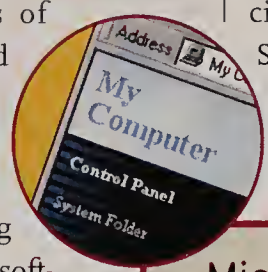
MORE BAD NEWS

EVEN SOME existing NT-compatible devices may not work with Windows NT 5.0. When we plugged in a Hewlett-Packard DeskJet 890C printer, Plug and Play noticed it was there and attempted to install the appropriate drivers. But HP's Windows NT 4.0 drivers turned out to be incompatible with NT 5.0, and the device wouldn't run. In NT 5.0, Microsoft intends to support devices previously supported in NT 4.0, according to Russ Madlener, an NT product manager. However, NT 4.0 support remains spotty for many categories of hardware products (notably scanners and inexpensive printers). Moreover, many peripherals manufacturers may never get around to developing NT 5.0–compatible drivers, especially for older products that are no longer manufactured. On the other hand, vendors may be more diligent about providing Windows NT 5.0 drivers for new products if they think that a sizable percentage of their customers will be moving to the new OS.

To address the dearth of NT drivers, NT 5.0 and Windows 98 will support Microsoft's new Win32 Driver Model. This architecture will let vendors create drivers for mice, scanners, and other input devices that will work with both operating systems. Some products already include WDM drivers. Again, there are major limitations: Printers

and video cards will still require NT-specific drivers.

The outlook may not be pretty. Users of NT 5.0 could face various compatibility problems affecting existing hardware and software. Clearly NT 5.0 won't be attractive if you have to worry about whether a particular PC, program, or peripheral will work with it.



Microsoft is positioning NT as its main OS for business. That means Windows 98 could be the last of its breed.

NOTEBOOKS AND NETWORKS

WITH WINDOWS NT 5.0, Microsoft plans to address one of NT 4.0's most notable deficiencies—its lack of power management for portable computers. To eke maximum life out of notebook batteries, NT 5.0 will rely on Advanced Configuration and Power Interface, a sophisticated new technology that will appear first in Windows 98 next year.

The catch is that ACPI is still an emerging standard, not fully supported even by new notebooks at this time. However, Dean McCarron, a principal at Mercury Research in Scottsdale, Arizona, believes that by the second quarter of next year, new notebooks will be able to take full advantage of NT 5.0's power management. Current systems that provide only partial support for ACPI may be upgradable through BIOS updates. If you've got an older notebook that supports only ACPI's less robust predecessor, Advanced Power Management, you may be out of luck and out of power. (Microsoft says it hopes to provide these older systems with some limited power management but it makes no promises.)

Like its predecessor, NT 5.0 will support multiprocessor PCs and will be available in a version for systems based on Digital Equipment Corporation's Alpha processor. These features make the OS a prime candidate for individuals like designers and engineers, who require the fastest computers. (Windows 95 and 98 will not be equipped with these high-end capabilities).

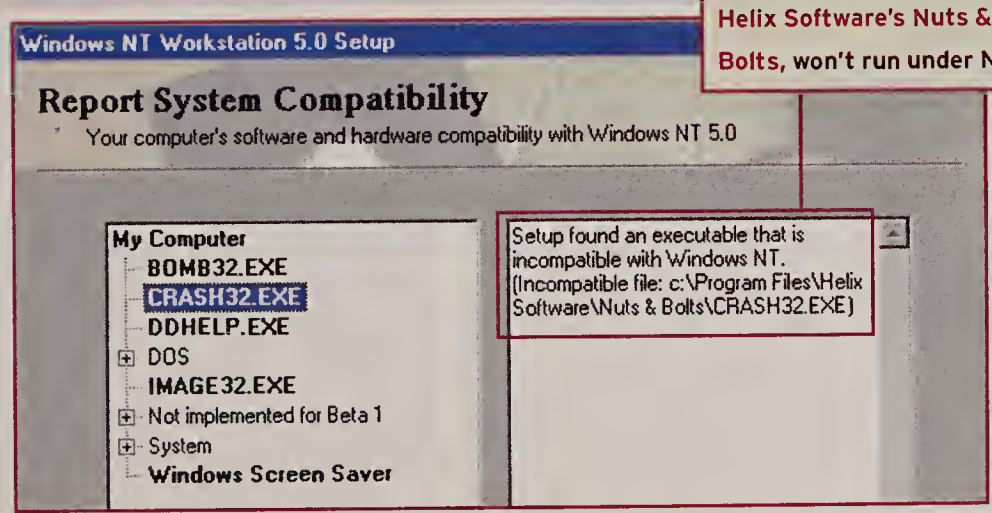
At the same time that it ships Windows NT Workstation 5.0, Microsoft also plans to deliver version 5.0 of Windows NT Server, the network operating system version of NT.

NETWARE CHALLENGER?

PLANNED NEW features include an improved directory system, which is important for IS departments that need to manage large networks. Microsoft claims this capability will rival the directory services that have long distinguished Novell's network operating systems from NT. Other new NT Server features are designed specifically for those who plan to use NT Workstation 5.0, such as IntelliMirror, which will perform a silent ongoing backup of a desktop computer to the file server. Microsoft also plans to include features in NT Server that will simplify the deployment of standard corporate applications; for example, one capability will download applications to a system automatically as they are needed. ▶

SOFTWARE COMPATIBILITY

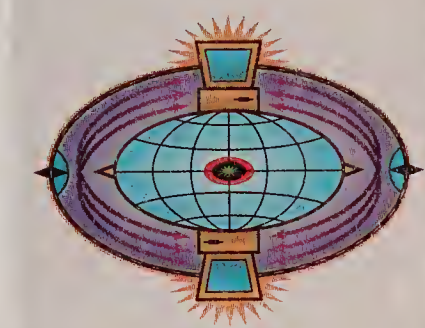
The good news	The bad news
• A growing number of new software packages run under NT.	• Many older programs of all types won't run. • Utilities may not be available in NT versions. • Games and multimedia applications can present problems. • DOS TSR programs aren't compatible.



SOFTWARE INCOMPATIBILITIES: Many utilities, such as Helix Software's Nuts & Bolts, won't run under NT.

ISP Guarantee Has Fine Print

SPRINT'S FLAT-RATE Internet service is the first to offer a guarantee: If you ever fail to get a Net connection due to a busy signal, you get a week of free service. Sounds good, but you need to work for your freebie. If you get a busy signal from your local dial-up number, you have to call customer service, which will provide an 800 number from a pool of reserve access numbers. If you still can't connect, you have to call customer service again to get a $5 credit—the equivalent of one week's service. If the problem recurs, Sprint will grant additional credits. Guarantees like this are likely to become more common as major ISPs seek to differentiate themselves to consumers, IDC analyst Ted Julian says.



92 kbps Over Standard Phone Lines?

A NEW TECHNOLOGY will let you download data off the Net at speeds of up to 92 kilobits per second over standard phone lines. But you'll need two 56-kbps modems that adhere to the K56flex specification, two phone lines, and an ISP equipped with a special communications device called CommPlete from Multi-Tech Systems. The latest version of the device uses a new technology to split data in half, sending each half over one of the two analog phone lines. For the 92-kbps service, Multi- ▶

WINDOWS OF THE FUTURE

IN THE NEAR future, expect NT 5.0's ship date to be a moving target—not unusual for a piece of software as complex as an operating system. At press time Microsoft had not set a date. Microsoft's Russ Madlener says the next beta should be available early in 1998. But *Windows Watcher's* Dwight Davis doesn't expect Windows NT 5.0 to hit store shelves until late 1998 or early 1999, roughly six months after he expects the oft-delayed Windows 98 to finally appear in the marketplace.

When ship day comes, PC users along with their IS departments will choose between Windows 98 and Windows NT Workstation 5.0. They'll square off on issues such as NT's security and stability versus Windows 98's software and hardware compatibility. But in the long run, the decision may be much simpler: Microsoft is positioning NT Workstation as its main operating system for businesses, says Davis. That means Windows 98 could be the last of its breed.

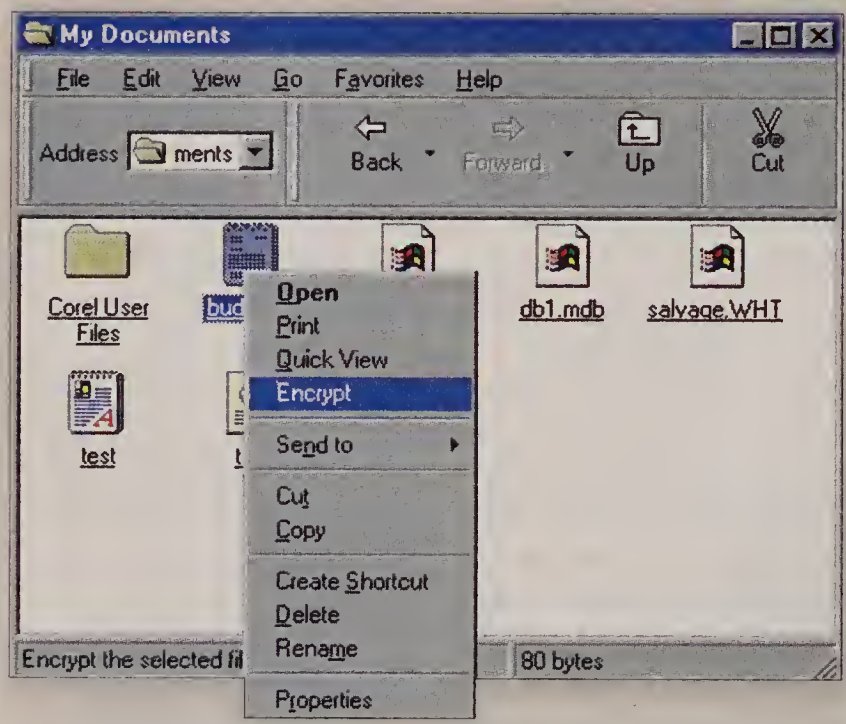
But when that might happen is still unclear—even when you ask Microsoft. "We'd like to merge the [architectures]," says Microsoft's Madlener, but he acknowledges that many companies still rely on old DOS software that won't work under Windows NT. Still, Bill Gates has said publicly that a "consumer" version of NT could eventually occupy a spot in Microsoft's operating system lineup similar to the positions held by Windows 95 and 98.

Of course, even the mighty Microsoft can't force users to migrate to an operating system until they're good and ready. Just ask any of the millions of folks who have stuck with the most widely used OS in the country, one that's installed on more PCs than Windows 95 and NT combined, according to market research firm Computer Intelligence: good old Windows 3.1.

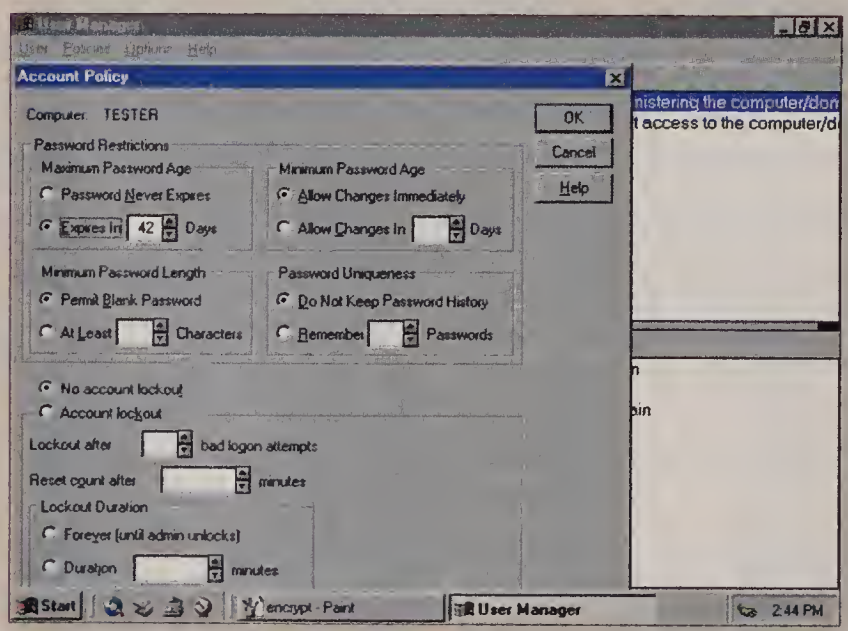
—*Harry McCracken* ▶

No-Nonsense Security

LIKE ITS PREDECESSOR, NT 5.0 boasts security features that Windows 95, Windows 98, and Windows 3.1 can't match. These features are particularly useful for securing files and data on PCs or notebooks that are shared by more than one person.



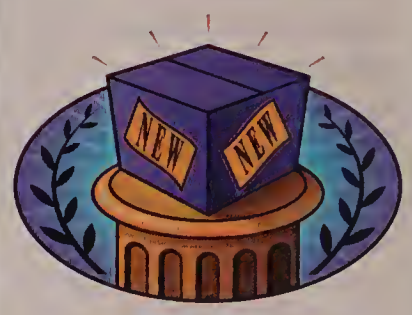
FILE ENCRYPTION: New in NT 5.0, file encryption appears as an option when you highlight a file and right-click. Encrypted files are password-protected, which means your employees can borrow your notebook without being able to view your confidential data.



SERIOUS PASSWORD MANAGEMENT: NT 5.0's User Manager can be set up to ensure that passwords are changed regularly and meet minimum or more stringent security standards.

JUST IN

Tech's Paul Kraska says he expects ISPs to charge about twice what they charge for 56-kbps access. At press time it was unclear how many ISPs planned to offer 92-kbps connections. Multi-Tech already has one customer, a small ISP in Minnesota that plans to offer the service, Kraska says.



$100 Color Scanner

STORM TECHNOLOGY has announced EasyPhoto ImageWave, a 30-bit scanner that handles text, photos, and graphics on paper up to 8.5 by 11.7 inches at a resolution of 600 by 300 dots per inch. The device is expected to sell for about $150, but Storm will rebate $50 by mail through the end of January. Less than a year ago, comparable products cost about $300. The product includes Xerox's TextBridge OCR and Adobe Photo Deluxe 2.0 software. The scanner attaches to a PC via parallel port. *PC World* has not tested the EasyPhoto, but it performed well in a demonstration.

Ready for Prime Time?

NEW YORK TIMES and *PC World* columnist Stephen Manes is about to hit the TV screen as half of *Digital Duo*, a new PC show. Manes and *Wall Street Journal* columnist Walter Mossberg promise independent, critical, and humorous perspectives, along with snide comments and pointed arguments. Scheduled to air on public television stations nationwide November 9 and 16 at 6 p.m. EST and PST.

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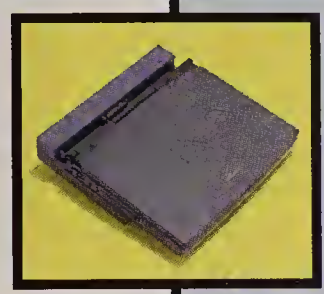

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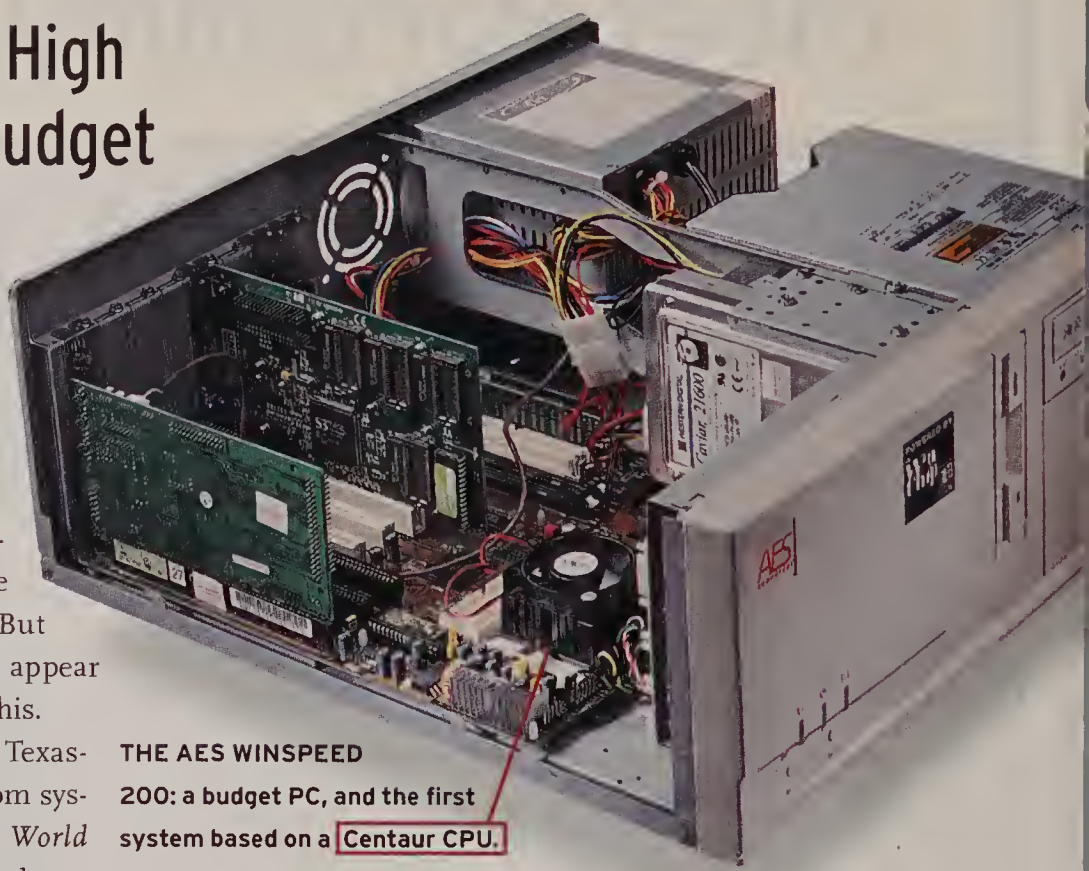
"Centaur Inside" Means High Performance on a Small Budget



THE AES WINSPEED 200: a budget PC, and the first system based on a Centaur CPU.

A NO-NAME company designs and builds its own Pentium MMX–class processor that's nearly as fast as its Intel equivalent, but sells it for a fraction of the price. And the company started from scratch less than two years ago. Fiction, right? Wrong. Last month Centaur Technologies arrived on the scene with a streamlined MMX processor. Better yet, a system based on Centaur's IDT WinChip C6 actually matches Intel Pentium MMX performance on Windows 95 business applications but costs 34 percent less.

COMPROMISES

OKAY. THERE ARE some caveats—among them, poor floating-point and MMX performance. And it won't run NT very well, the designers admit. Even though Centaur's new CPU raises the price/performance bar in the Pentium-compatible market, only one third-tier system vendor has come forward to sell it. But more are expected to appear by the time you read this.

AES Computers, a Texas-based builder of custom systems, provided *PC World* with its $1184 WinSpeed 200 desktop PC configured with the 200-MHz WinChip C6, 32MB of EDO RAM, a 1.6GB hard drive, a 24X CD-ROM drive, and a 15-inch monitor. We compared it to 53 previously tested 200-MHz Pentium-class systems using our PC WorldBench test suite. The result: an average 3 percent performance difference on business applications between the slowest—Centaur's and Intel's—and the fastest—AMD's and Cyrix's (see the performance chart). So for mainstream Win 95 business apps, all four 200-MHz Pentium-compatible processors are created about equal.

But price/performance is a different story (see "New Centaur C6-Based PC Delivers Great Value"). That Pentium MMX-200 system that gives you the same performance as the C6 costs on average a whopping 50 percent more. In other words, every dollar that you spend for "Intel Inside" costs just 66 cents for "Centaur Instead."

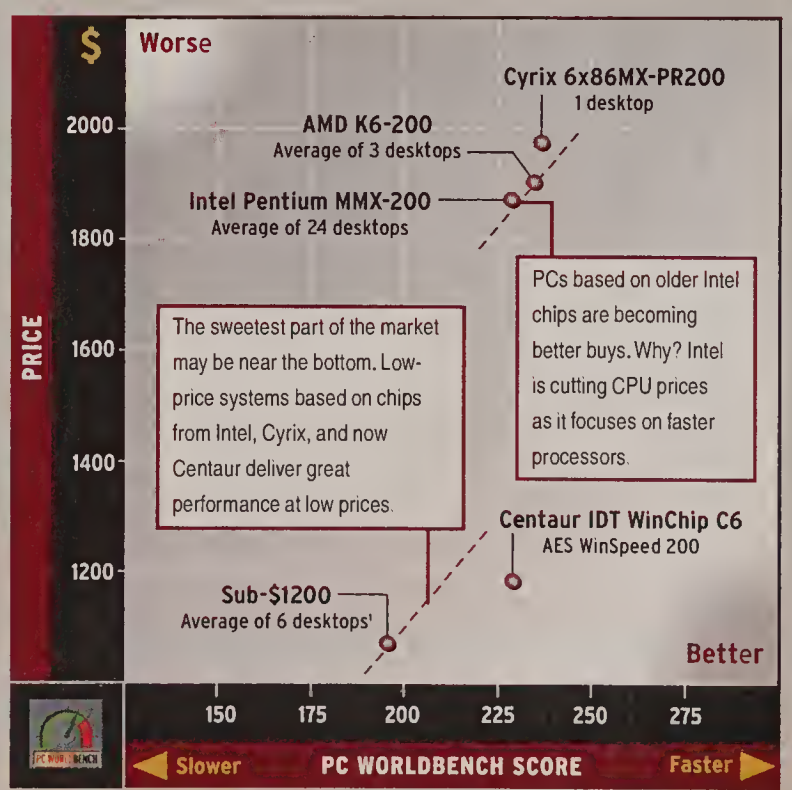
MULTIMEDIA CRAWL

BUT THE C6 doesn't look nearly as good when you're thinking MMX multimedia. At its best, the C6 fell behind the average Pentium MMX in our Macromedia Director tests by 16 percent, and at its worst crawled through the Adobe Photoshop tests at an even slower rate of 40 percent. Centaur was candid about the processor's deficiencies. According to Jamal Haider, Centaur's director of marketing, "The C6 is not optimized for MMX and floating-point ▶

New Centaur C6-Based PC Delivers Great Value

COMPETITION IN the CPU marketplace continues to drive prices down and performance up. With the entry of Centaur, there are now three companies fighting to get a share of Intel's business.

All of the systems on this chart are good values, but the best buys are the ones closest to the lower right-hand corner. (Note: This analysis is based on performance of business applications and does not include MMX scores.) The Centaur C6-based AES WinSpeed 200 nearly matches the business performance of AMD, Cyrix, and Intel systems that cost 50 percent more. One caution: Will AES deliver the service you expect?



PCs falling on dashed lines have comparable price/performance values. [1]Intel and Cyrix.

PHOTOGRAPHS: KEVIN CANDLAND

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Samsung announces a breakthrough in monitor technology with its "p" series professional monitors. Building on its award-winning technology, the new space age design of these high-powered monitors features Samsung's unique Display Director™ on-screen control system for advanced screen adjustments. Free Colorific® Color Matching software and a special ARAS UltraClear™ screen coating provide precision color with the sharpest, clearest, brightest images possible. With a 230MHz bandwidth, the 1000p offers superior performance with an ultra-fine 0.25mm dot pitch and completely flicker-free resolutions up to 1600 x 1200 at 85Hz. TCO '95 compliant, SyncMaster™ "p" series monitors are compatible with all platforms and conform to the latest plug and play standard (DDC 2B+). Samsung's 24-hour/7-day live telephone support is available to handle any service needs or questions. Simply breaking new ground. Simply Samsung.

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MAX RES.	1600 X 1200 @ 85HZ	1600 X 1200 @ 68HZ	1280 X 1024 @ 60HZ
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*21" monitor includes a one-year on-site replacement warranty. ©1997 Samsung Electronics America, Inc. Software featured is 3D Studio MAX®, from Kinetix. Colorific is a registered trademark of Sonnetech, Ltd., San Francisco. All other brand, product and service names and logos are trademarks or registered trademarks of their respective manufacturers and companies. Ad: Arnell Group

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PC MAGAZINE EDITORS' CHOICE
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Centaur C6 PC: Strong Performance for Bargain-Seeking Buyers

C6 PC KEEPS PACE FOR BUSINESS APPS...

SYSTEMS	CPU	RAM (MB)	PC WorldBench score
Average of 3 desktops	AMD K6-200	32	235
Average of 3 desktops	Cyrix 6x86MX-PR200	32	235
Average of 47 desktops	Pentium MMX-200	32	231
AES WinSpeed 200	IDT WinChip C6-200	32	229

All systems had 512K of secondary cache.

Word 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · WordPerfect 6.1 for Windows · Excel 7.0 for Windows 95 · Paradox 5.0 for Windows · 1-2-3 release 5 for Windows

...BUT LAGS ON MULTIMEDIA

SYSTEMS	CPU	Video RAM (MB)	Macromedia Director 5.0 with MMX plug-in: Frames per second[1]
AES WinSpeed 200	IDT WinChip C6-200	2	68
CyberMax Max C5 200+ MMX	Cyrix 6x86MX-PR200	4	76
Polywell Poly 500 MX8	AMD K6-200	4	76
Average of 9 desktops	Pentium MMX-200	various	81

[1]Higher is better.

Adobe Photoshop 4.0 · Fractal Design Ray Dream Studio 4.1

How We Test

BUSINESS APPLICATIONS: We tested all systems with PC WorldBench, PC World's Windows 95 application-based benchmark. Higher scores are better. For a description of PC WorldBench 1.0 tests, see PC World Online (www.pcworld.com/testing).

MULTIMEDIA APPLICATIONS: We tested each system using a series of MMX-enabled applications. In Adobe Photoshop 4.0, we time two image editing operations. In Fractal Design Ray Dream Studio 4.1, we time how long it takes to redraw rendered 3D scenes at two levels of complexity. In Macromedia Director 5.0, we play a graphics-intensive Director executable file.

Data based on testing conducted by the PC World Test Center. All rights reserved.

instructions." Those enhancements will come with the release of the C6+ processor (at speeds up to 266 MHz) next spring, along with 3D instructions to boost performance of Microsoft's DirectX technology. Accelerated Graphics Port is yet one more wait-till-next-year item. Chip sets that support AGP won't be ready until the spring.

Centaur Technologies is the brainchild of Glenn Henry, a marquee name in the esoteric world of CPU design. His efforts to develop a hybrid RISC-x86 processor (hence the name Centaur) interested SRAM manufacturer IDT Technologies, which launched Centaur as a subsidiary in 1995. And despite his high-powered résumé, the one-time IBM fellow has few illusions about his company's potential to take on Intel. "We're not going to set the world on fire," he says. "In fact, I don't expect to take many sales [to system makers] away from Intel." His targets: AMD and Cyrix. Henry figures his customers will be value-conscious buyers not afraid of a no-name.

> A system based on Centaur's IDT **WinChip C6** actually **matches Intel** Pentium MMX performance on **Windows 95** business applications but **costs 34 percent less.**

How will he do it? By making his chips smaller, cheaper, and more versatile. The Centaur chip contains four layers of metal instead of five, and has a die size of 0.88mm, about half that of AMD's K6. And it's small enough to fit in a standard mobile package. Centaur sells the notebook version of the WinChip C6 at the same price as the desktop version—$160. By contrast, Intel charges $604 for its notebook chip and $252 for the desktop version.

Centaur is optimistic about its prospects in a market Intel has scorned: the sub-$1200 desktop. By our count, the average Pentium MMX-200 system sells for $1871, and even the least expensive Pentium MMX-200 we've reviewed (the ProGen Atlas X-200) sells for $1509—more than $300 above the price of AES's WinSpeed 200. If you're a budget-minded buyer and you're not running many AGP-, MMX-, or FPU-intensive apps (such as 3D games or CAD), WinChip C6–based systems could be right for you.

—*Susan Silvius*

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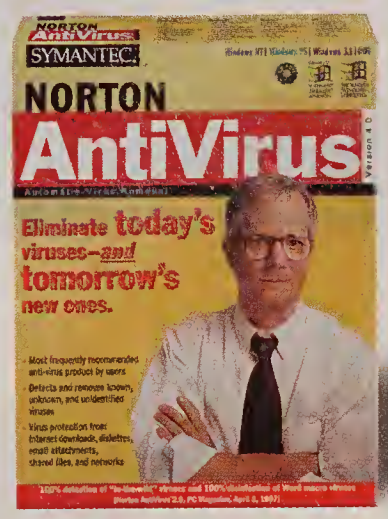

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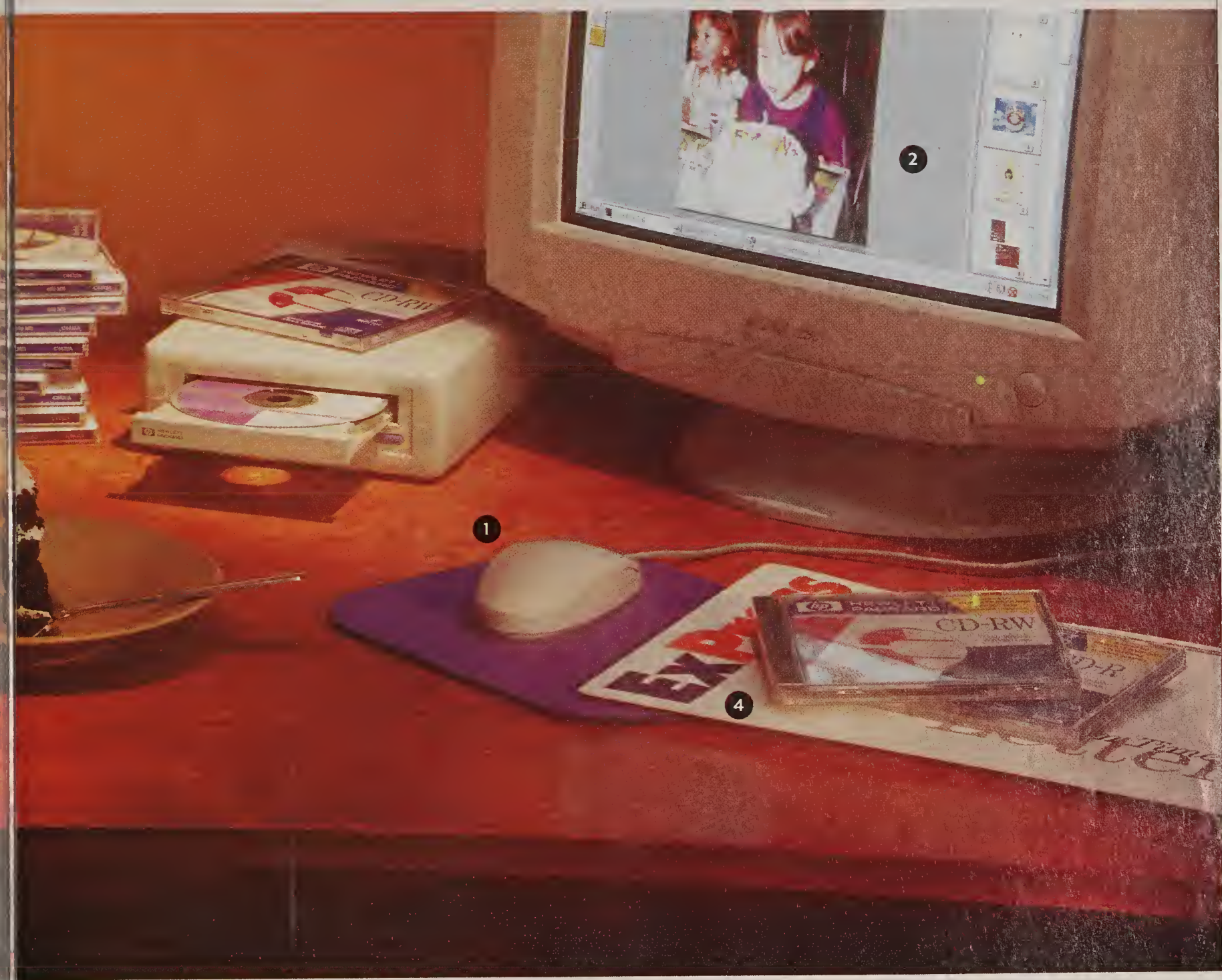

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HEWLETT® PACKARD

Mooove Over Gateway (Here Comes Sony, NEC, CompUSA...)

ANALYSIS

BUYING A PC gets easier every day. In the last six months, 11 PC vendors and retailers announced plans to offer custom-built systems. At least two companies (CompUSA and Packard Bell NEC) are going head-to-head with Gateway and Dell by taking orders for systems via phone and the Internet.

And more are expected to follow. Sony dipped its toe into the water in September, when it started selling a limited number of configurations by phone. Even Compaq, which said it would never follow suit, has jumped into the fray, selling PCs over the phone and on the Web. "This is the way consumers are saying they want to buy," reports David Goldstein, president of Dallas-based consulting firm Channel Marketing. "A lot of people are buying replacement computers and want specific configurations."

How attractive are the suitors vying for your direct dollar? That depends on your needs, since the new players are targeting somewhat different types of users and have different strengths.

MEGAMUSCLE

COMPUSA APPEARS to be the most formidable of the new players, thanks to its well-established infrastructure and an annual $4.6 billion in sales muscle. The Dallas-based company plans to challenge everyone from Compaq to the local screwdriver shop. Although this strategy will put CompUSA in competition with the very manufacturers it depends on to stock its stores, the company says it isn't worried. After all, plenty of vendors would kill to get on a CompUSA shelf. "They are happy to have us sell their systems, and we're happy to be selling ours as well," says Carol Elfstrom, CompUSA spokesperson.

Through CompUSA's chain of 134 retail outlets, customers can kick the tires on the company's build-to-order systems, which carry the American and American Pro names. Who builds them? CompUSA won't tell. But analysts say Acer America and Elite Computer Systems are two of the leading candidates.

CompUSA's machines offer options for the latest technology, such as DVD drives. Customers choose most major components, including the CPU, sound card, speakers, and hard drive. You can order at in-store kiosks, by phone, on the company Web site, or through corporate field representatives. A business lease option is available, but CompUSA makes no provision for consumer leasing.

> "This is the way **consumers** are saying they want to buy....[They] want **specific configurations,**" says David Goldstein of Channel Marketing.

The merged Packard Bell NEC operation has a slightly narrower focus for its build-to-order program, launched last summer as NEC Now. The company says it's aiming at the home office and small office markets and the more experienced consumers.

One problem: Packard Bell's shaky reputation among sophisticated computer buyers, the very customers the NEC division is targeting (see "PC Reliability and Service" in the June issue). Although the two divisions share a manufacturing facility in Sacramento, California, the company says machines bearing the NEC label are not built on the same assembly line as Packard Bell models.

Just like CompUSA, NEC offers the latest technology—the company said it was ready to ship 300-MHz Pentium II machines the day Intel unveiled the chip. It also sells a Hughes satellite dish for Internet access at up to three times the speed of an ISDN line.

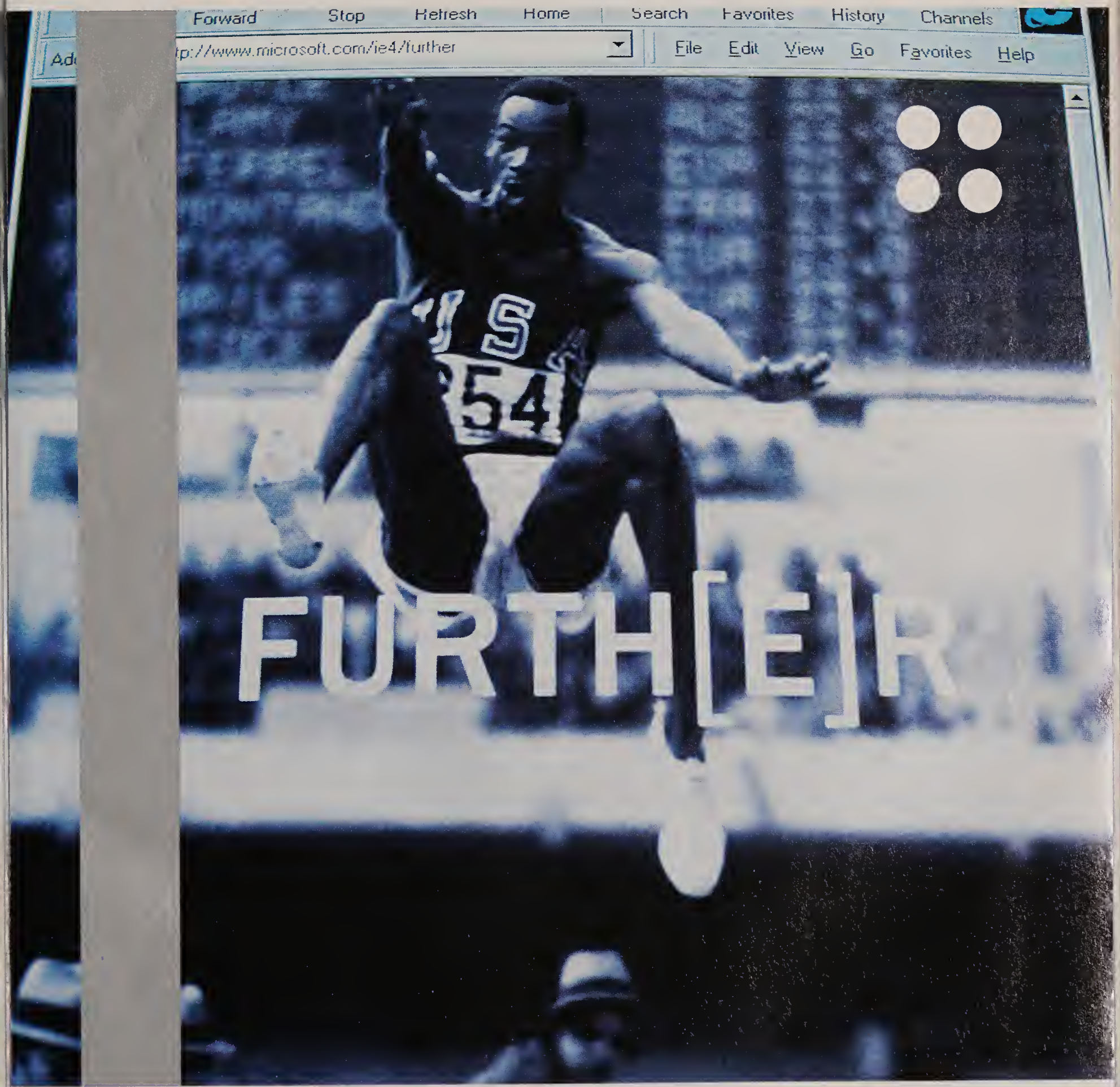
But NEC buyers have fewer choices of components than CompUSA customers do. For instance, all the machines in the Direction line include a 24X CD-ROM drive, a Yamaha OP14 sound chip, and an ergonomic keyboard, whether the buyer likes it or not.

In early October NEC was taking orders only by phone but planned to sell build-to-order computers via its Internet site by November.

CAUTIOUS SONY

SONY'S DIRECT operation is far less ambitious than that of the other new entrants. Its primary target is the home computer user, and that means Sony won't let you order a machine that has NT 4.0 ▶

ILLUSTRATION JOSÉ CRUZ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preloaded or pay with a company purchase order.

Dependent on retailers for distribution, Sony is carefully avoiding the appearance of posing a threat to these partners. In fact, even though the company offers complete computer systems, it says it's more interested in selling accessories that might be hard to find in a store. "Our strategy is not to compete with a Gateway or a Dell, but to complement our core distribution strategy," says Patrick Vogt, national sales and marketing manager for Sony's direct sales and marketing division.

Sony was also slower than the competition to offer a Pentium II-300 machine. The company planned to begin shipping PII-300s in late October. Under its Vaio line, it is already selling a limited selection of preconfigured, fully loaded systems aimed at the high end of the market. Buyers' only major option is the monitor. Sony accepts orders by phone only and claims to ship within 24 hours, compared to five business days for its build-to-order competitors.

Seymour Merrin, president of Merrin Information Services in Palo Alto, California, doesn't think that Packard Bell NEC or Sony represents a serious challenge to the Dells and the Gateways. Why? It will be hard for these companies to build the complex order-taking and fulfillment operation that is needed to move high volume.

However, CompUSA may be a force the others will have to reckon with.

It already has a service-and-support setup in place. It can build to order without having to set up another distribution channel. And just over the horizon, Circuit City, Office Depot, and RadioShack are exploring build-to-order–type operations, suggests David Goldstein. What does increasing competition mean to buyers? Dell, Gateway, Micron, and others may have to respond with lower prices or better offerings. Sounds like a win for consumers.

—Daniel S. Levine ▶

The ABCs of Armchair Shopping

NOT ALL 800 NUMBERS are created equal. *Build to order, configure to order, mail order,* and *direct order* are just a few of the buzzwords you hear as vendors rush to snag the armchair PC buyer. Though the differences between these terms may seem minor, they can be significant.

Here's a brief guide to sales methods in the new shopping trend.

BUILD TO ORDER Will assemble a computer to your exact specifications (such as Gateway and Dell).

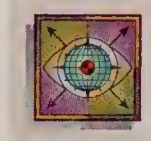
CONFIGURE TO ORDER Sells PCs with some standard features, but you dictate the specifics of others, such as hard drive and modem (like NEC).

MAIL ORDER Sells PCs in set configurations by mail, phone, or the Internet.

DIRECT ORDER Uses sales representatives in the field to call on corporate customers (think of IBM's "blue suits").

WEB BROWSER

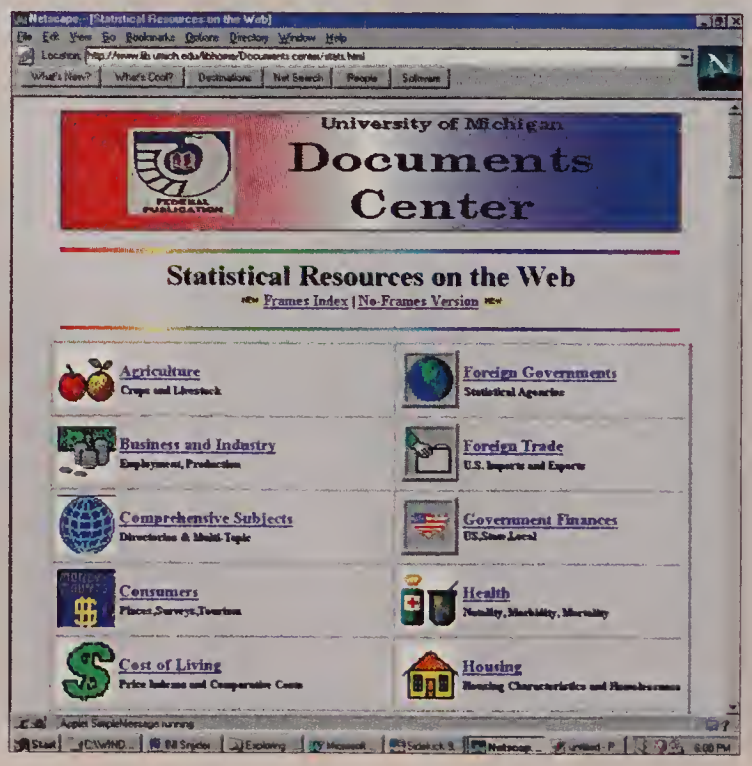
Stats From Web Back Up Your Big Ideas



YOU HAVE THE greatest product idea of your life. At least you think you do. But before you throw a bundle into developing this little gem, you'd better do some research. Doing your homework about markets and competitors can help you refine your ideas, attract investors, and avoid catastrophe. Where to turn? The Web, of course.

If you're new to this type of research, begin at the Library Research Guide: Marketing for Engineers (bion.mit.edu/depts/barker/me2009/index.html), by the Massachusetts Institute of Technology's Barker Engineering Library. Though written for engineers, this clear, concise primer is relevant to anyone doing market research. It points you to resources on and off the Web, and even offers tips for conducting effective Internet searches.

Another worthwhile stop is the site of *American Demographic* and *Marketing Tools* magazines (www.demographics.com/home.htm). You can search and retrieve full-text articles from these two magazines at no charge. The site contains tips on market research and marketing strategies, and links to specific surveys and reports, some of which require a fee. Wondering about an audience for a new kind of putter? Search on 'golf' and the database returns a study of the communities with the highest per capita number of golf holes in the nation.

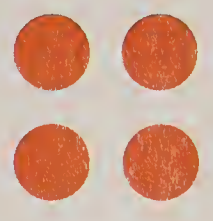


THE UNIVERSITY OF MICHIGAN offers one of the best market research sites on the Web.

The biggest collector of the type of information you're likely to need is the U.S. government. But rather than scour the pages of each agency in hopes of finding what you're looking for, try using Fedstats (www.fedstats.gov), which allows you to access the sites of more than 70 federal agencies.

Need more government info? Similar to Fedstats is Statistical Resources on the Web (www.lib.umich.edu/libhome/Documents.center/stats.html) from the University of Michigan's Document Center. The two overlap somewhat, but the university site has a broader list of offerings, even if it is littered with cheesy out-of-the-box graphics.

—Daniel S. Levine



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Where's the Remote? TV-Style Commercials Invade Web

STREAMIX founder Robert Lee

CONSUMER ALERT

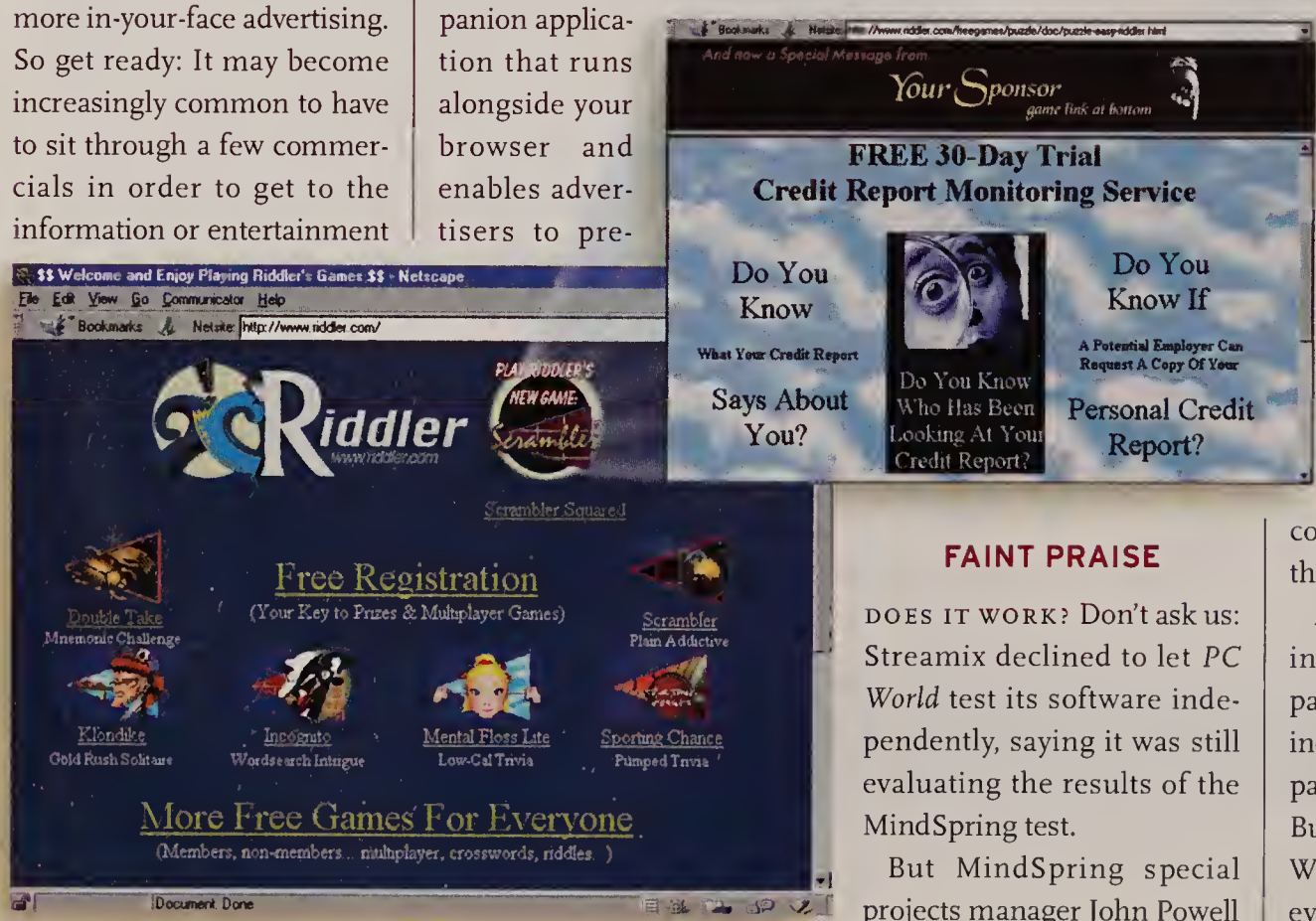
LAST SUMMER ABOUT 1000 subscribers of Internet service provider MindSpring got a sneak peek at what might be the future of online advertising. What they saw were cyber–sales pitches that looked a lot like TV commercials: full-screen animated ads complete with sound tracks.

IN YOUR FACE

LIKE IT OR NOT, advertisers are leaving no pixel unturned in their quest for consumer attention. The latest wrinkle—*interstitial advertisements*, ads that interrupt ongoing content. MindSpring's test, using technology developed by San Francisco–based Streamix, was only one step in the online industry's march toward more in-your-face advertising. So get ready: It may become increasingly common to have to sit through a few commercials in order to get to the information or entertainment you came for in the first place.

Unlike you, advertisers are annoyed by the fact that banner ads are easy to ignore. But there's no ignoring Web commercials. In Berkeley Systems' You Don't Know Jack online game show (www.bezerk.com), when the host says it's time for a commercial, TV-like ads fill the screen. Or check out the Riddler game site (www.riddler.com), where you must scroll through a full-page ad before being able to play the game you selected.

If you think that's annoying, how would you like to see a commercial before every Web page? Would you download a special program to do so? Streamix is betting you will. Its proprietary HyperStitial technology relies on a companion application that runs alongside your browser and enables advertisers to present full-screen commercials during the delay as Web pages download. According to Streamix founder Robert Lee, "Our technology doesn't slow communication [between the user and the Web site] at all." The advertisements, he says, are downloaded to your system by the ISP while you're staring at a Web page and your browser isn't sending or receiving data.



INTERSTITIAL ACTION: You came to play a cool game. But first you have to check out an ad. Boring? Tough luck. It's the wave of the future.

FAINT PRAISE

DOES IT WORK? Don't ask us: Streamix declined to let *PC World* test its software independently, saying it was still evaluating the results of the MindSpring test.

But MindSpring special projects manager John Powell says that 70 to 80 percent of the feedback from beta testers was "nonnegative." Translation: They didn't hate it.

However, Streamix acknowledges that some users were irritated by the advertisements, and HyperStitial's companion program will also display noncommercial content along with the ads in categories ranging from photographs and cartoons to factoids and Hollywood gossip. You'll be able to control what kind of nonadvertising material you see, but you won't be able to turn off the ads entirely.

Configuring your computer to display ads seems as ridiculous as requesting commercials from broadcasters, yet MindSpring's testers seemed willing participants. Maybe it's because full-screen, animated ads are a novelty that consumers will enjoy—until they become common.

Ads on the Web may be the inevitable price that surfers pay. After all, most of us have indicated our unwillingness to pay anything else for content. But if current trends continue, Web commercials will be everywhere—and there's no remote control in sight.

—*Jim Heid* ▶

PHOTOGRAPH: ANDY FREEBERG

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So smooth and easy flowing, naturally people flip for it.
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Windows CE 2.0 Adds Power and Color to Handhelds

MICROSOFT IS giving Windows CE a birthday makeover. Version 2.0 of the 1-year-old operating system for palmtops, set-top boxes, and other non-PC devices remedies many—but not all—of its predecessor's shortcomings.

The upgrade will make its debut by the holidays in a new generation of $600 to $900 handhelds from Casio, NEC, and at least five other vendors. Even if you took a pass the first time around, improvements such as larger color LCD screens, printer support, and improved connectivity might make these new portables worth a second look—if you can live with the undersize keyboards on most of them. Do you already own a CE 1.*x* device? Several vendors will allow you to add the software improvements via a ROM upgrade.

DO YOUR OWN CE THING: Taking advantage of Windows CE 2.0's flexibility, NEC's MobilePro 700 is the largest handheld with the new operating system. The keyboard rivals those on mininotebooks.

BIG-SCREEN CE

THE MOST visible difference you'll notice between most Windows CE 1.*x* and 2.0 handhelds is the displays. The CE 2.0 handhelds are bigger, and they provide resolutions of up to 640 by 240—the equivalent of a VGA screen cut in half crosswise. With the lone exception of Hewlett-Packard's late-arriving CE 1.1 device, the 320LX, earlier products were limited to 480 by 240 resolution. In addition, CE 2.0 handhelds support up to 256 colors, compared with four grays in 1.0 devices.

Most of the new handhelds come with faster processors and support rechargeable batteries (as well as the AA batteries found in the earlier devices). CE 2.0 also supports several hardware features that were introduced in late-arriving CE 1.*x* devices, including backlighting, voice recorders, and built-in hardware and software modems.

What's New in CE 2.0 Handhelds?

- New, faster processors
- More memory
- Larger, sharper displays with up to 256 colors
- Printing support (including support for TrueType fonts)
- Rechargeable battery packs
- Spelling checkers
- Pocket PowerPoint
- More synchronization options
- Pocket Internet Explorer upgrades, including frames support
- ROM upgrades for some CE 1.*x* devices
- Internal modems, voice recorders, backlighting options

PRINTING AND PRESENTATIONS

ON THE SOFTWARE side, you can now send Pocket Word and Pocket Excel documents directly to your printer. You can also send and receive e-mail attachments, and check the spelling of documents created in Pocket Word, the slimmed-down version of Microsoft Word that comes with the OS. You can now export Microsoft Outlook data from your desktop to four pocket applications—Inbox, Addresses, Calendar, and Tasks. Ethernet support permits direct connection to a network via PC Cards.

You can even take PowerPoint presentations on the road with a pocket version of Microsoft's popular presentation application. You can't create presentations in Pocket PowerPoint, but you can make minor editing changes and annotations. Pocket PowerPoint stores presentations in compressed form, so some fancy formatting can't be ported, and you're limited to 256 colors. But when displayed via a VGA-out card and projector or monitor, slides will shine in full VGA format.

UPGRADING CE 1.X DEVICES

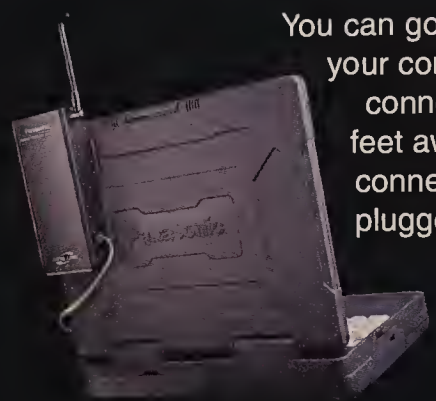
OWNERS OF MOST Windows CE 1.*x* devices from Casio, Hewlett-Packard, NEC, and Philips will be able to enjoy the new software features by taking advantage of a ROM upgrade that will be free to recent buyers, and will cost $100 to $129 for those who bought before early September. LG Electronics may let owners of its Phenom Windows CE 1.0 palmtops trade them in for new Phenom IIs for only a small shipping and handling charge.

To enjoy the hardware benefits, you'll have to invest in a new unit. But you won't see every new hardware feature on every new device, and unlike with the first crop, the handhelds won't all look alike. This time around, Micro- ▶

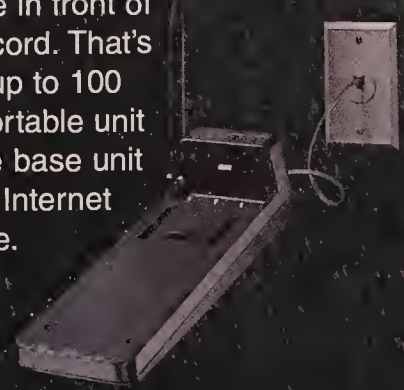
PHOTOGRAPHS: KEVIN CANDLAND

Surf Cordless.

**Panasonic introduces the Cordless Data Link.
A cord-free connection for your modem.**



You can go anywhere in the world on the Internet. As long as you're in front of your computer. Connected to a modem. Connected to a phone cord. That's connected to the wall. Well, now you can disconnect and go up to 100 feet away, with the Cordless Data Link from Panasonic. The portable unit connects to your laptop and transmits a 900 MHz signal to the base unit plugged into your phone jack. Up to v.34 (28.8 kbps). So, now Internet users will finally go someplace they never go. Outside.



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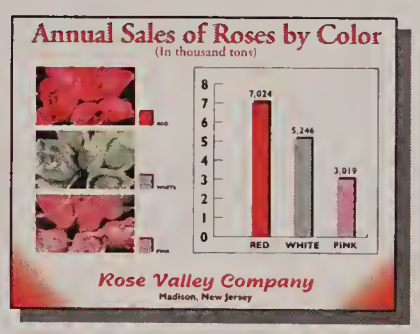

Databases/ Spreadsheets

From internal newsletters to company reports, wherever there's a story to tell, you can tell it better with pictures taken with a Sony Digital Mavica.

Digital Mavica is compatible[2] with Windows® 3.1/Windows® 95/ Windows NT® 4.0 or Mac™ OS System 7.5.

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1. Continuous recording (10-second intervals with flash off) 2. Some systems may require supplied ArcSoft™ software

SONY

like never before!

SHOOT!

Point and shoot!

With Sony's new Digital Mavica® Still Camera, adding pictures and images to make professional looking documents has never been easier. Digital Mavica records on a standard computer floppy so you can play it back on virtually any PC. No more hassles with cables, interfaces or drivers.

Finally, a Digital Still Camera with Real Camera Features like a 10x power zoom lens with 1" macro capabilities and auto-focus, auto-white balance and auto-iris for proper exposure and a built-in flash and self-timer. Five Camera Mode Settings allow control of prevailing light conditions:

10-to-1 ZOOM LENS

- Portrait • Landscape
- Beach and Ski • Sports
- Sunset and Moon

Never miss a shot! Sony's InfoLithium™ Rechargeable Battery allows up to 500 continuous shots[1] with a single charge as it powers a large 2.5" color LCD screen for composing, monitoring and playback.

Digital Mavica is compatible with virtually any PC. It uses universally compatible high density 3.5" standard computer floppies that can hold up to 20 high resolution or up to 40 standard resolution images in 24 bit color, 640 x 480 (VGA) JPEG format.

STORE!

A single disk can store up to 40 images!

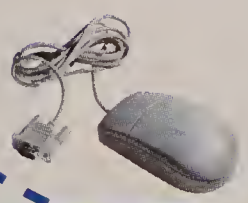
Slip the floppy into a PC and watch the work come alive. Digital Mavica is compatible[2] with Windows®3.1/Windows® 95 /Windows NT®4.0 or Mac™ OS System 7.5. Add images to your spreadsheets, newsletters, Websites or any popular imaging software. Digital Mavica also comes with ArcSoft PhotoStudio for creative options to manipulate images, add text and change backgrounds.

If you can picture it on a floppy, you can see it in your work!

MICROSOFT® WINDOWS™ COMPATIBLE 32-Bit Application

Mac™ OS

ARCSOFT PhotoStudio



SHOW!

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FIRST CE 2.0 PDAs OFFER BETTER DISPLAYS, MODEMS

PRODUCTS	Street price	Dimensions (inches)	Weight (ounces)	RAM (MB)	Display	Modem	Reader service number
Casio Cassiopeia A-20 888/204-7765 www.casiohpc.com	$600	7.3 x 3.7 x 1	15.2	8	4 grays	none	777
Hewlett-Packard 360LX 800/443-1254 www.hp.com/handheld	$700	7.2 x 3.7 x 1.1	15.6	4	16 grays	none	778
Hitachi HPW-20 800/448-2244 www.hitachi-ce.com	not yet priced	7.1 x 4.2 x 1.2	14.1	8	4 grays	33.6-kbps software	779
LG Electronics Phenom II 800/243-0000 www.lgphenom.com	$600	7.7 x 4.3 x 1.1	16	8	4 grays	21.6-kbps software	780
NEC MobilePro 700 888/306-4636 www.nec-computers.com	$800	9.6 x 4.8 x 1.2	24	8	4 grays	33.6-kbps hardware	781
Philips Velo 500 888/275-8356 www.velo1.com	$600-$750	6.8 x 3.8 x 1	14	8-16	16 grays	28.8-kbps software	782
Sharp Mobilon HC 4500 800/237-4277 www.sharp-USA.com	$900	7.3 x 3.7 x 1.1	17.5	8	256 colors	33.6-kbps software	783

soft has given vendors much more freedom to differentiate their products.

As a result, prices vary widely, from $600 basic monochrome models to $900 for Sharp's color Mobilon HC 4500 with 8MB of RAM, a 33.6-kilobits-per-second modem, and a voice-memo recorder. Sharp, which makes its Windows CE debut with three Mobilons, plans to ship its color units in December. Other vendors were still seeking better solutions for color's huge power drain (LG estimates the battery life of its upcoming color unit at 10 hours, compared with about 40 hours for a monochrome unit).

Sharp gets the award for most imaginative—not to say oddest—Windows CE accessory: An optional $349 PC Card with a lens attached lets you use the Mobilon as a digital camera. The screen is your viewfinder, and a button on the device lets you capture images for storage inside the unit. We would have loved to try this feature, but it was not available at press time.

NEC's MobilePro 700 also deserves special mention because of its unusual size. While most Windows CE 2.0 palmtops are slightly larger than standard 1.0 devices (to accommodate the slightly bigger screen), the MobilePro 700 is significantly larger than any other 2.0 device, with a roomier keyboard than you'll see on mininotebooks like Toshiba's Libretto.

UPSIZING CE: The Cassiopeia A-20 (right) has a larger screen than the original but is only slightly bigger. One way Casio was able to save space was by moving the speaker from the lid to just above the keyboard.

Microsoft was still tweaking the code for Windows CE 2.0 at this writing, so we saw only preproduction units of a few devices. All are still relatively light (the 1.5-pound MobilePro 700 is the heaviest), and the new features make them more like ultraportable, limited-function notebooks than personal digital assistants. But the undersize keyboards on most of these devices still preclude serious use as even a low-end notebook substitute. Even with the MobilePro 700's easy-to-type-on keyboard, you still must use a stylus as a pointing device, which feels awkward.

Microsoft has said all along that Windows CE can be tailored for a variety of hardware, including PDAs, set-top boxes (such as WebTV), and smart phones. The set-top boxes are already out, and vendors say privately that the first palmtop versions should appear early next year. Phones should follow by the end of 1998. If these devices live up to expectations, Windows CE may yet be a winner.

—*Yardena Arar* ■

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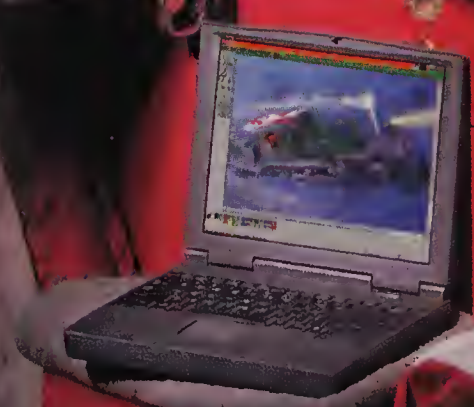

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Gateway Solo 2300, Windows Sources *Stellar Award, October 1997*

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Gateway Solo 9100, PC Magazine *Editor's Choice, August 1997*

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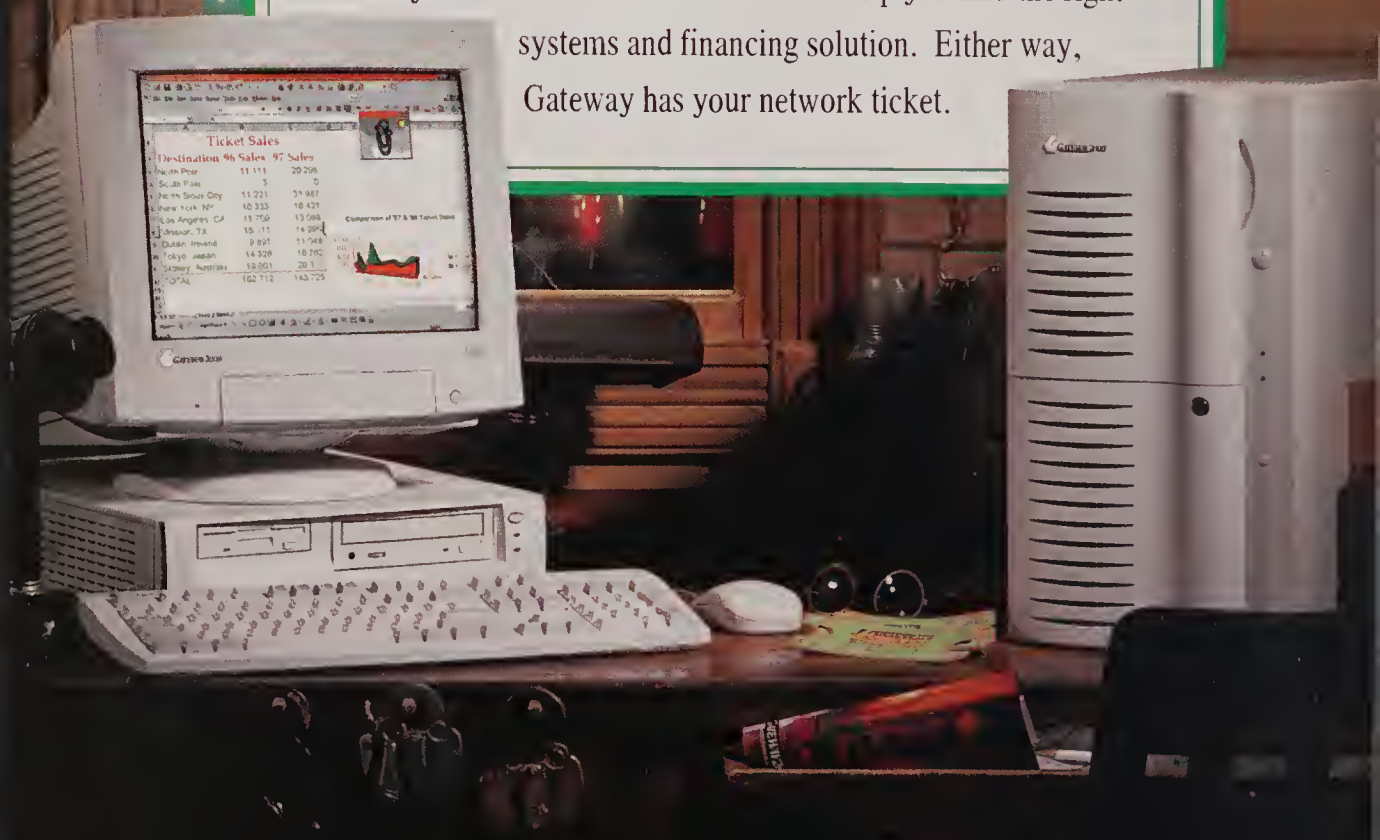

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Gateway GP6-233, PC World Power Desktop, October 1997

GP6-266

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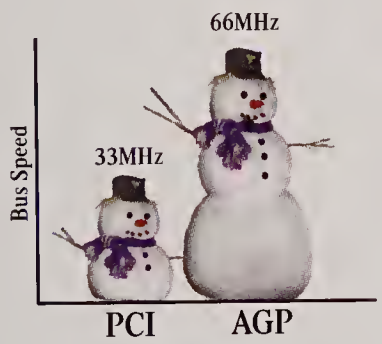

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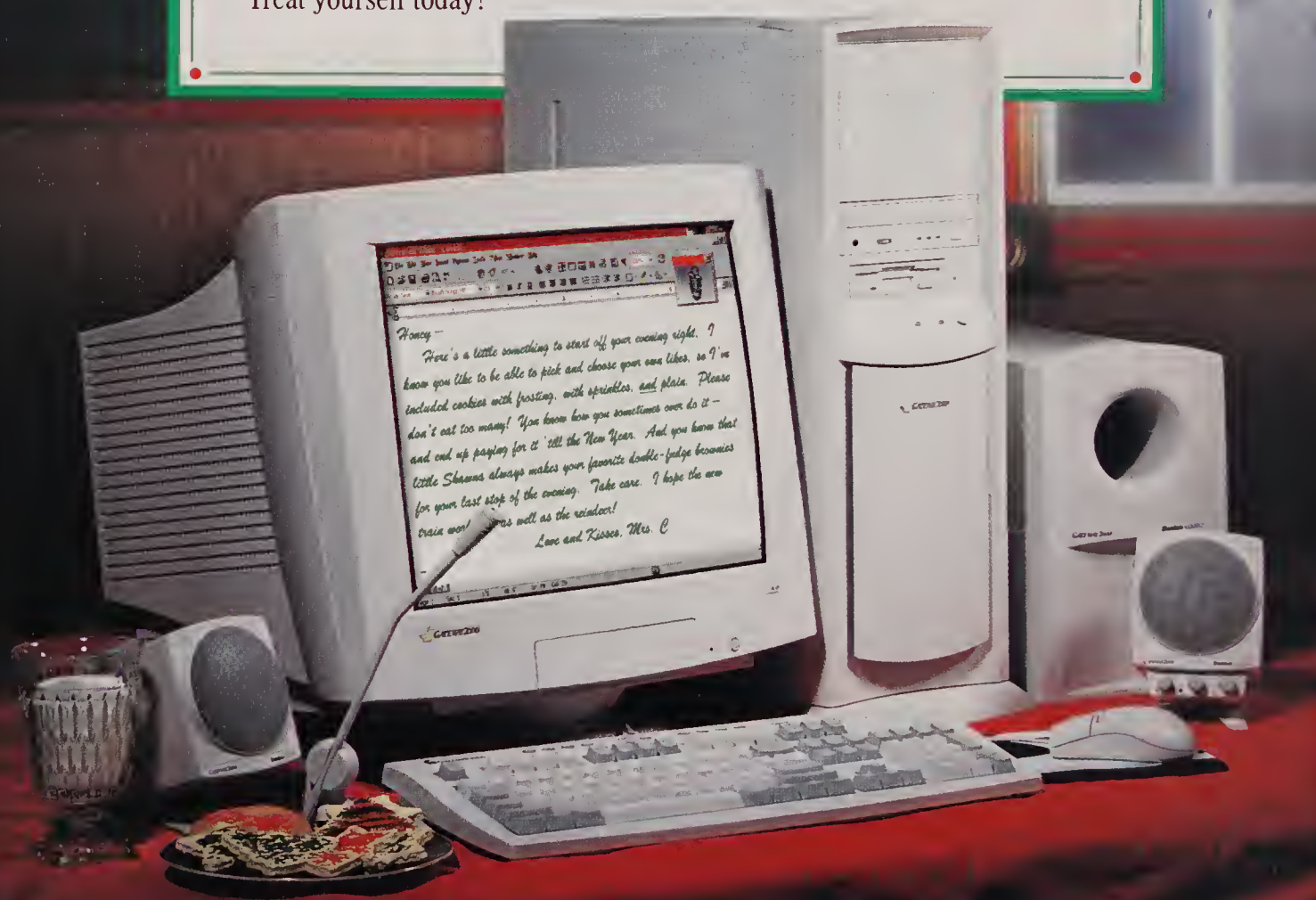
We're whipping up delectable multimedia performance and value. No one else comes close to having all Gateway's multimedia goodies.

We start off right by giving you a choice of software. Not just *any* software, it's all from Microsoft and DreamWorks Interactive. We joined forces with these creative, cutting-edge software and entertainment companies to create "Microsoft Choice" — four exceptional packages of top-selling software. You tell us which best meets your needs and we'll install it for you.*

Of course we have the hardware to make all this amazing software really cook too. We've even found a way to deliver Intel's next-generation processor technology, the **Pentium® II** processor, for less than $2,000! That's only $70 a month, and you own the system the moment it arrives. Now the question isn't whether you can afford it, it's how could you possibly let this amazing opportunity pass by? Because the processor isn't the only cool thing on this system. It's loaded with all the frosting and sprinkles for amazing value. We've blended feature-packed systems, award-winning service and support, and great prices to make Gateway G-Series multimedia systems both irresistible and affordable. And each is unique because we make them after you order. Treat yourself today!



Gateway G6-300XL Multimedia PC with Boston Acoustics MediaTheater Speakers
See our Software and Peripherals pages for more details.

Gateway G-Series Multimedia PCs for the Home

Desktop PCs For The Home

G5-166

Intel® 166MHz Pentium® Processor with MMX™ Technology
16MB SDRAM
512K Pipelined Burst Cache
EV500 .28 Screen Pitch
15" Monitor (13.9" viewable)
2MB 3-D 64-Bit PCI Graphics
1.6GB 12ms Ultra ATA Hard Drive
12X min/24X max CD-ROM Drive
3.5" Diskette Drive
Ensoniq® Wavetable Audio
Altec™ Lansing ACS-41 Speakers
TelePath® Modem *for Windows* with x2™ Technology**
G-Series Desktop Case
MultiFunction Keyboard & Microsoft® Mouse
MS® Windows® 95
Microsoft Home Essentials Software
Color Bubble Jet Printer
Gateway Gold℠ Service & Support for G-Series PCs

$1499 As low as* $52/mo.

PC World *Best Buy August 1997*

G6-233 BEST BUY

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 32MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- ▸ **nVidia™ 4MB 3-D AGP Graphics**
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Altec Lansing ACS-41 Speakers
- TelePath Modem *for Windows*, with x2 Technology**
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse™
- MS Windows 95
- ▸ Microsoft Home Essentials Software
- Gateway Gold Service & Support for G-Series PCs

$1999 As low as* $70/mo.

PC World *Best Buy September 1997*

G6-266

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 32MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- ▸ **nVidia 4MB 3-D AGP Graphics**
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics® MicroMedia™ 3-Piece Speaker System
- TelePath Modem *for Windows*, with x2 Technology**
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
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- ▸ Microsoft Choice Software
- Gateway Gold Service & Support for G-Series PCs

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G6-300

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 32MB SDRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- **nVidia 4MB 3-D AGP Graphics**
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics MicroMedia 3-Piece Speaker System
- TelePath Modem *for Windows* with x2 Technology**
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- MS Windows 95
- ▸ Microsoft Choice Software
- Gateway Gold Service & Support for G-Series PCs

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G6-300XL

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
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- ▸ **nVidia 4MB 3-D AGP Graphics**
- TV/FM Tuner Card
- 8.4GB 8.5ms Ultra ATA Hard Drive
- ▸ **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
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- MultiFunction Keyboard & MS IntelliMouse
- MS Windows 95
- ▸ Microsoft Choice Software
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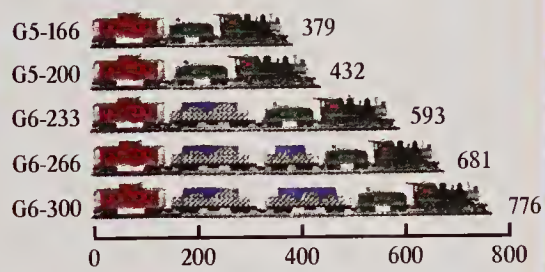
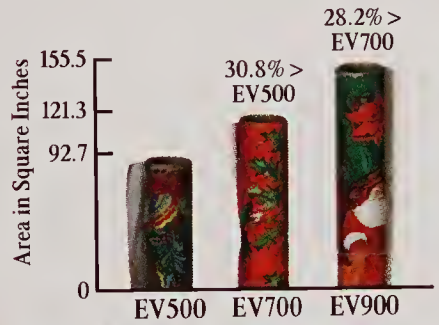


CPUmark$_{32}$ is a 32-bit test that reflects the processor usage of 32-bit applications and focuses solely on a PC's CPU, RAM, cache and cache controller.

For more information on how these benchmark scores were achieved, please call the Gateway FaxBack® service and request document #2471. Benchmark information is also available on our Web site, www.gateway.com.



The EV900 increases your viewing area and has a smaller footprint than other 19-inch monitors. That means one less roll of wrapping paper this holiday season.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a PC.)

- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
  - ▸ upgrade from EV500 **$400**
  - ▸ upgrade from EV700 **$200**
- **Gateway Gold Pemium Service and Support** — an extended Three-Year On-Site Agreement†† including priority 800 number for access to technical experts.
  - ▸ At time of system purchase **$99**
  - ▸ Within current on-site service agreement **$129**

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Now your Gateway family is closer than ever before. All new Gateway G-Series computers and Destination Big Screen PC/TVs and DMCs include state-of-the-art x2 modem technology and access to our exclusive *gateway.net* customer Internet service.

††On-site service is available to most locations in the continental United States, Alaska, Hawaii, Puerto Rico and Canada after you and your Gateway technician determine an on-site visit is necessary. On-site service is provided by PC Technology Services, Inc. On-site is not available for any monitor, mouse, keyboard, or portable system. Write or call for a free copy of the on-site service agreement.

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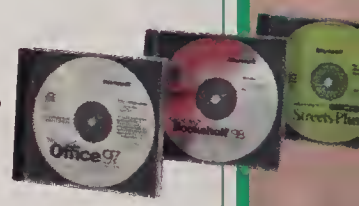
Through a special arrangement with premier software developer, Microsoft, we've put together a trainload of top-of-the-line software — including titles from entertainment giant DreamWorks Interactive. You choose your standard software from four options, but we don't stop there. You can easily and affordably add more software to your PC as an upgrade. And, when you order extra software at the same time you order your system, we'll even load it for you.

Microsoft® Home Essentials

Microsoft Home Essentials comes standard on our special G5-166 and G6-233 Best Buy packages. All the essential tools for home computing are there, including: Word, Works, Encarta® Encyclopedia, Greetings Workshop and Arcade. Plus it's easy to add another specialty pack from our software upgrades. You won't find a better deal anywhere.

Microsoft Choice Options

Gateway G-Series PCs (except the G5-166 and G6-233 Best Buy), and all GP-Series PCs and Destination systems, let you continue to personalize your PC with Microsoft Choice. Look over the following packages and tell us which one best meets your needs. Microsoft Office 97, Small Business Edition does not include Microsoft Home Essentials, while the other three suites do.



- **Microsoft Office 97, Small Business Edition**

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- **Microsoft Professional Resource Suite Plus Microsoft Home Essentials**

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- **Microsoft Action Titles Plus Microsoft Home Essentials**

  Experience incredibly realistic graphics, explore new worlds and tackle tough challenges with these action-packed games. Includes Close Combat™; Flight Simulator; Age of Empires™; Monster Truck Madness™; DreamWorks Interactive™: DILBERT'S™ Desktop Games; and DreamWorks Interactive: The Neverhood™.

- **Microsoft Child Adventure Suite Plus Microsoft Home Essentials**

  Kids love these educational and entertaining software titles designed to encourage adventure and exploration. You'll appreciate the parental control and PC security features. Includes Microsoft Plus! For Kids; DreamWorks Interactive: Chaos Island: The Lost World™; DreamWorks Interactive: Goosebumps™: Attack of the Mutant™ 98; Scholastic's The Magic School Bus™ Explores in the Rain Forest; MS 3-D Movie Maker; Scholastic's The Magic School Bus Explores in the Age Of Dinosaurs and Creative Writer 2.

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Now you can get Developer's Tools from Microsoft. That's exciting! Because we wanted to make sure we were putting together the best package of development software available, we weren't quite ready with the details at press time. Please call your sales rep or check out our Web site for all the specifics.

Please note the majority of software you see here is pictured in its retail package for easier viewing. Not all software is pictured. You will receive the actual software on CD.

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- **Microsoft Child Adventure Suite Upgrade $99**

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- Microsoft SideWinder® Joystick **$59**
- Starter Kit **$59**
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- PalmPilot™ Personal Data Organizer **$249**
- Hewlett®-Packard ScanJet 5Pse Color Scanner **$299**
- APC 650 Pro UPS **$329**

Starter Kit

Hewlett-Packard ScanJet 5Pse Color Scanner

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- Hewlett-Packard DeskJet 694C Color Printer **$269**
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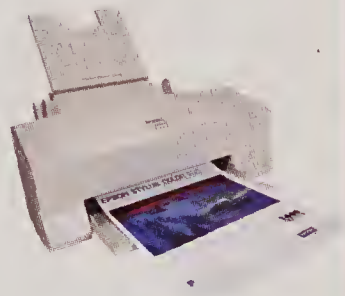
- Hewlett-Packard LaserJet 6Lse Laser Printer **$399**
- Epson Stylus COLOR 800 Ink Jet Printer **$399**
- Hewlett-Packard LaserJet 6Pse Laser Printer **$799**



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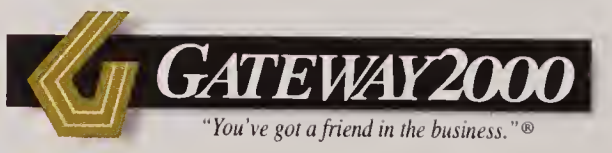

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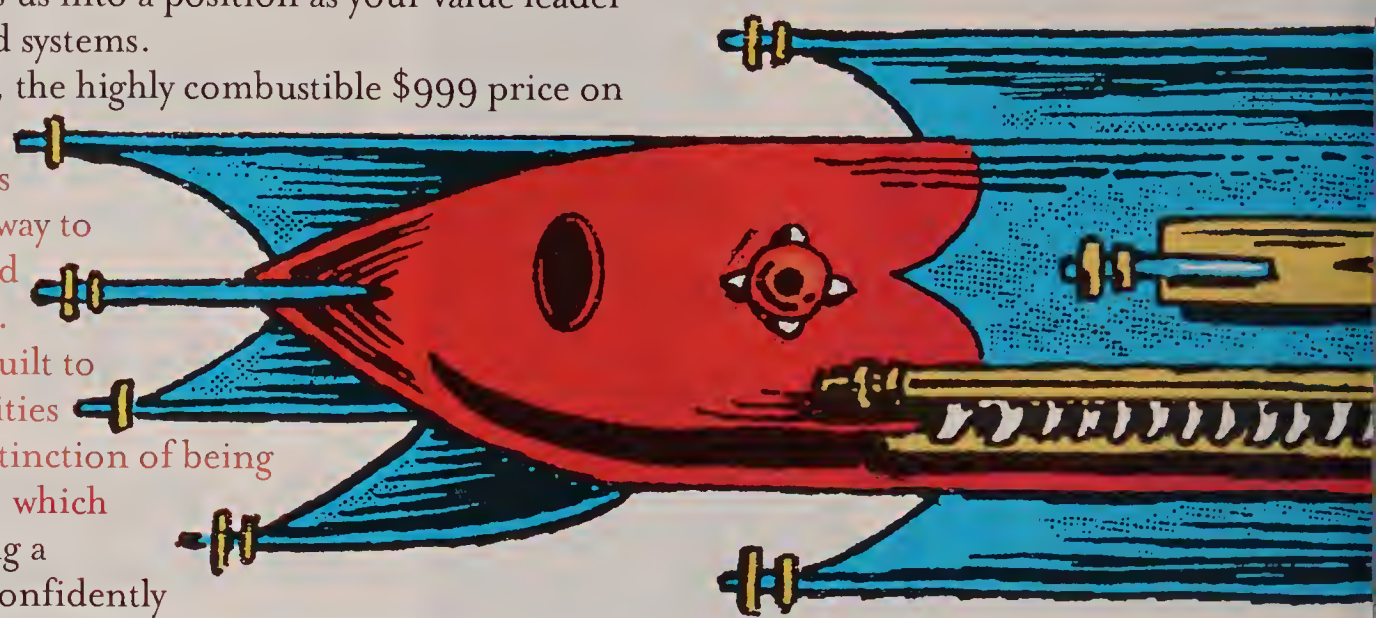

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CS Price2 233
Intel 233MHz Pentium II Processor
512KB Internal Cache
32MB EDO DIMM Memory
4.0GB UltraDMA Hard Drive
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Every time you put a computer on someone's desk you have two options. You can either make that person happy, or unhappy. We suggest you choose the former.

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Inside you'll find the latest innovations. Like Intel Pentium® II processors, so your end users can do more, faster.[1] A 24X MAX CD-ROM[2] for increased performance. Ultra ATA hard drives for ultra-fast transfer rates. Remote wakeup so your system can be updated during off hours. Up to 512KB cache for added memory and speed. Prefailure warranties[3] so you can catch component problems before they happen. You can even expand the memory of most Deskpro models up to 384MB.

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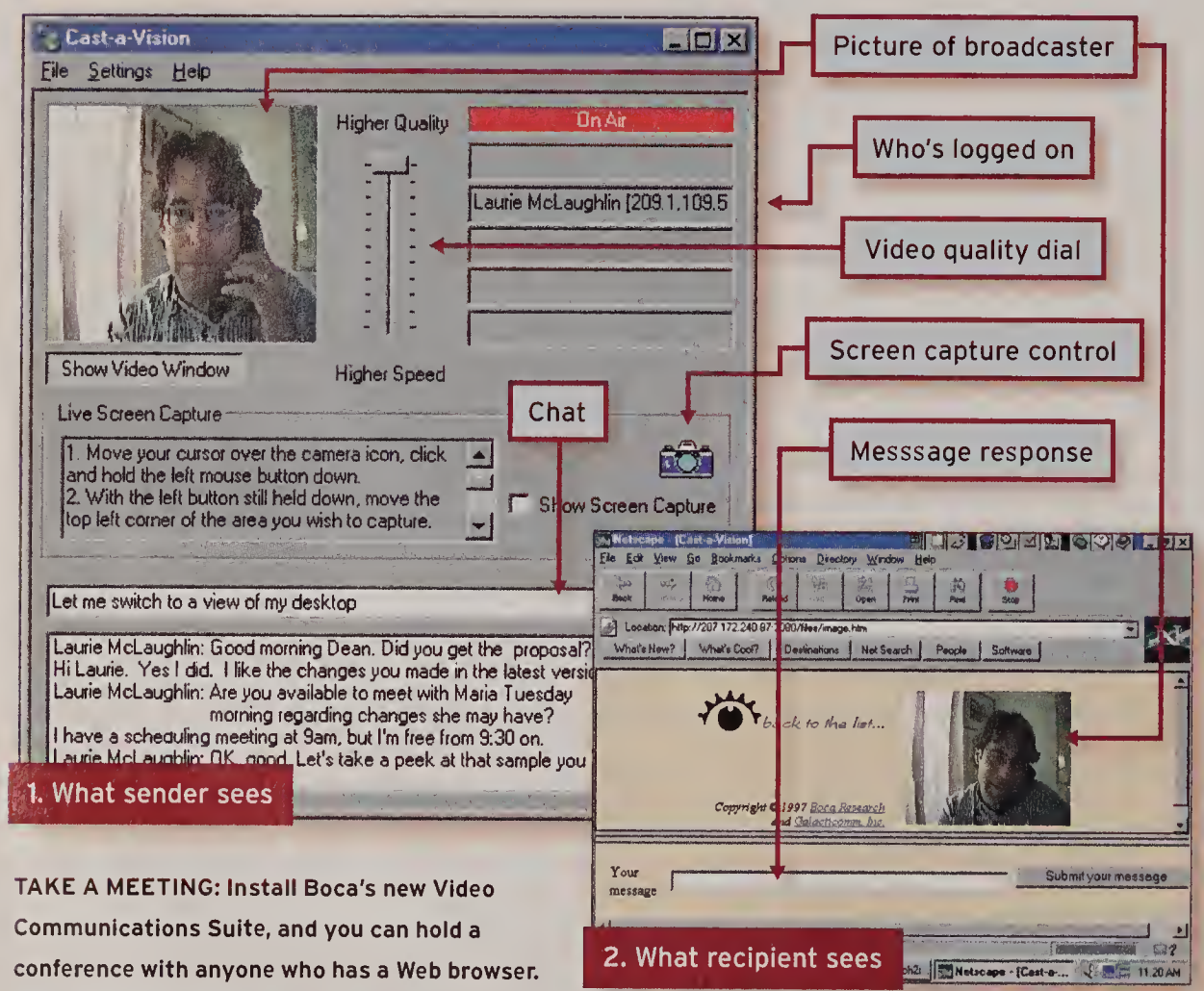
COMPAQ

trademark of Intel Corporation. [2]Certain features ually fail when using Compaq Insight Manager.

NEW PRODUCTS

Broadcast News: Boca's Video Communications Suite



TAKE A MEETING: Install Boca's new Video Communications Suite, and you can hold a conference with anyone who has a Web browser.

COMMUNICATIONS

IN THE MARKET for a new modem for your home office? Take a peek at Boca Research's new **Video Communications Suite.** This $239 kit bundles everything you need to start Internet broadcasting from your PC, including a combination 56-kilobits-per-second modem and video capture card, a digital camera, a microphone, and a host of communications software. It lets you host a one-to-many Web show, and handles videoconferencing, faxing, and basic video capture tasks. Considering that you could pay $150 just for a 56-kbps modem, Boca's suite is priced quite affordably.

When you're at home, you can use the suite to pitch to clients or collaborate with your boss. It won't let you broadcast a whole group sitting around a conference table, though. The kit's Rockwell-made camera, which sits atop your monitor, shows only one or two people at a time.

The most innovative part of the kit is Cast-a-Vision, software that lets you do a live Webcast for an audience of up to four people. All they'll need is a Web browser and a sound card. In my work with a preproduction version, Boca's kit was simple to use.

To conduct a broadcast, you launch your Web browser and the Cast-a-Vision software, then visit Boca's broadcast site (www.bocaplace.com). When you view the site, Cast-a-Vision starts broadcasting your signal. With the camera sitting on your monitor, you're ready to switch back and forth from the camera view to a live shot of your PC's desktop, which can be shown through a very small window. It's useful for displaying a small graph, but not a full-page spreadsheet.

Your audience browses the Boca site and clicks on your name from the list of active broadcasters. Audience members with Java-capable browsers will automatically hear your audio; others will need an audio plug-in program (available at the site). The site also supports two-way text chat. Since the audience can see and hear you but you can't see or hear them, you may want to talk by phone as well. For security, you can password-protect the session.

Remember, today's 56-kbps modems do not provide true

Video Communications Suite

PRO: Easy to install, great broadcast software.

CON: For best performance, requires an ISP that supports K56flex spec.

VALUE: Great price for the features.

Boca Research
561/241-8088
www.bocaresearch.com
Street price: $239

READER SERVICE NO. 785

56-kbps speeds for uploads; actual broadcast speeds will vary from 28.8 kbps to 33.6 kbps, depending on your Internet service provider connection. It's only on the receiving end that the modems come close to 56 kbps. When I received a test broadcast at about 33.6 kbps, the frame rate seemed fast enough. But when the broadcast was sent at only 28.8 kbps, the session felt like a slow slide show.

Boca's modem uses Rockwell-Lucent's K56flex technology (which competes with 3Com/U.S. Robotics' x2 spec). Before you can harness the higher speeds, your ISP must support the protocol. Fortunately, Boca guarantees a free flash ROM upgrade once a 56-kbps standard becomes final.

BOCA'S BUNDLE: You get a modem/video card combo, camera, and mike.

The other software is generally useful. It includes VocalTec Internet Phone 4.0 for videoconferencing with full-duplex audio; Smith Micro's MessageCenter, for basic faxing; and VideoLink 324, for point-to-point conferencing (if the other person has the same software). Stefra's Video Control handles basic video capture and editing. There's also Microsoft's NetMeeting.

Thanks to Windows 95's Plug and Play, installing the kit was easy and took only 15 or 20 minutes. You'll need a Win 95 system with one open ISA card slot for the combo modem and video capture card. Once it's in place, you attach the microphone, camera, and speaker cables to the back of the card and install the software. An optional Y connector lets you pass audio through your sound card.

At such an affordable price, Boca's Video Communications Suite is a good choice if you're considering a new 56-kbps modem and would also like basic video capture and conferencing capabilities.

—Dean Andrews

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128 Intel Create & Share Camera Pack
129 SmartWheel utility, SparQ drive
132 Logitech FreeScan scanner
133 Kurzweil Madison voice utility
135 Mijenix FreeSpace
136 Microsoft Expedia Streets 98 and Rand McNally StreetFinder 98, Avery LabelPro, Extensis Portfolio 3.0
139 Matrox Video, Graphics, and TV Kit; Matrox m3D
144 Plan Write Expert Edition
146 CrystalGraphics Crystal 3D Impact

INTERNET

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Clever PCs for Small Business: HP's Brio Line

DESKTOP

IMITATION IS flattery in the case of Hewlett-Packard's new PCs for small businesses. The Brio systems, which replace the Vectra 500 models, give you stylish cases, easy-access interiors, and lots of on-screen help—all good features borrowed from HP's Vectra line of corporate PCs and consumer-oriented Pavilion systems.

PC World tested a shipping version of the top-of-the-line **Brio 8178,** a Pentium MMX-233 minitower with 32MB of RAM, a 12X–24X CD-ROM drive, and a 6.5GB hard disk. Street priced at $2388, it has a crisp 15-inch monitor, a sound card, a microphone, an internal 56-kbps x2 modem by 3Com/U.S. Robotics, a Matrox Millennium II graphics card with 4MB of VRAM, and a set of good-quality Labtec headphones. With a PC WorldBench score of 239, the Brio 8178 is not the fastest PMMX-233 we've tested, but it runs at above-average speed on business apps. However, the Brios are not exactly bargains: Comparable Dell Dimension and Gateway 2000 models can be had for at least a couple of hundred dollars less.

The Brio we tested was easy to set up, with a large, printed installation map and labeled cables. The Brios include valuable extra helpers for businesses that are too small to employ a full-time PC support staff. Extensive on-screen help, for example, not only explains how to do backups and how to network PCs, but also tells you *why*. The help features are great for novices yet are not intrusive. On the other hand, the printed documentation is thin.

As with the Pavilion systems, the Brio's keyboard has a set of extra keys for common tasks; I liked the volume and mute controls. Bundled software includes Microsoft Word 97 (but not Office), McAfee VirusScan, fax and phone utilities, and system diagnostics.

The Brio's design makes the PC easy to upgrade and service. Two latches on the sides of the case let you remove the top without tools. A neat interior gives easy access to all components (a refreshing change from many Pavilion models). HP has also given the Brio a pop-out motherboard—a time-saver if you need to replace the board. Overall, these are solid small-business systems.

—Tracey Capen ▶

Brio 8178

PRO: Excellent help features, smart design.
CON: Not for bargain hunters.
VALUE: A solid product.
Hewlett-Packard Co.
800/533-1333
www.hp.com/go/brio
Street price: $2388
READER SERVICE NO. 786

PHOTOGRAPH: MARC SIMON

EDITED BY
Yardena Arar and Laurianne McLaughlin

Microsoft

Because the dates on are

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From: New Microsoft Project 98
Date: Wednesday, 4:45 p.m.
To: Planning Committee
Re: One more little thing...

Your plan is perfect. You're in total control. Then all these...things...start happening. That's why the new Microsoft® Project 98 was built with a start-to-finish obsession about details. About scheduling. Staffing. Costs. The drill-down details that let you know what's happening and what's going to happen to your plan, your budget, and your due date. That's a complex job: Microsoft Project 98 makes it easy. You can go from an overview to the smallest detail in a couple of clicks, planning and tracking work on a daily, weekly, or monthly basis. It's integrated with Microsoft Office 97 and the Internet, so your documentation and communications are right there, from the kickoff memo to urgent e-mails. So while you've still got the time, check out the details at www.microsoft.com/project/.

Project 98.

the calendar closer than they appear.

Microsoft® Where do you want to go today?® www.microsoft.com/project/

Color for Any Budget: NEC's Ink Jet Printers

PRINTER

NEC'S NEW INK JET printers give you good color for very little green. The **SuperScript 750C** delivers vivid, near–photo-realistic output for only $199. It's a good choice for home, small-business, or workgroup use and compares favorably with printers that cost $100 more, such as Hewlett-Packard's DeskJet 694C. NEC's other new printer, the $119 **SuperScript 150C,** is the lowest-price color ink jet you'll find and is best suited to kids and students. I tested shipping versions of both.

The SuperScript 750C and 150C include well-designed printer drivers, as well as Brøderbund's excellent Print Shop software (for making cards, calendars, and the like) and Creative Wonders' Sesame Street Art Workshop, a nice CD-ROM title for children that provides coloring and art projects (and is sure to keep the color ink cartridges selling at a brisk clip).

SUPERIOR TEXT, SHARP PHOTOS: The $199 NEC SuperScript 750C stacks up well.

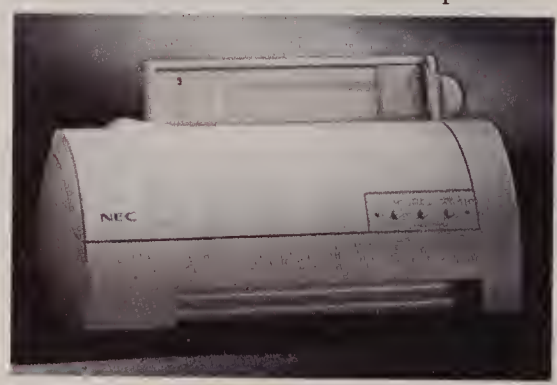
The SuperScript 750C holds a color and black ink cartridge at once and provides 600-dots-per-inch resolution. It prints two flavors of black: one for graphics, one for text and solid-black areas. This scheme yields crisp, coal-black text and line art that's of noticeably better quality than what you get from the single-cartridge SuperScript 150C and most other low-end ink jets. It's the 750C's biggest advantage.

For best photo quality, the SuperScript 750C accepts an optional $45 photo ink cartridge that prints stunning images when used with NEC's ultraglossy photo paper ($13 for ten sheets). The 750C's input tray holds 120 sheets of paper or 25 envelopes—slightly more than Canon's $199 BJC-4300, HP's $299 DeskJet 694C, or Epson's $299 Stylus Color 600. Draft printing is swift, at speeds up to 6 pages per minute. The SuperScript 750C is rated to print color pages at up to 2 ppm, but photo-quality images can take several minutes per page to print.

On the downside, the SuperScript 750C can't print banners, unlike the competing DeskJet 694C and BJC-4300. And at 18 inches wide and 18 inches deep, the NEC is noticeably bigger than its peers. But overall, it's a winner for the price.

The 600-by-300-dpi SuperScript 150C—at $119 the lowest-cost color ink jet to date—is designed for families and students on the tightest budgets. This compact (14 inches wide by 7 inches deep) printer ships with a color cartridge; an optional black-only cartridge costs $23. To switch between color and black inks, you must swap the cartridges in and out by hand.

The SuperScript 150C's text speed, rated at up to 3 ppm in draft mode, is acceptable if you use the black-only cartridge. (Printing black text with the color cartridge is slow and a waste of ink, since the cartridge has to make multiple passes to create black.) The 150C takes at least 3 minutes to print a color page. It doesn't support a photo cartridge, and color images appear grainy.



SPARE PARTS: You can buy a color printer for $119, but the 150C is best as a spare for kids.

The SuperScript 150C's main appeal is its price: It's $20 cheaper than its closest competitor, the $139 Lexmark 1000 Color Jetprinter. The Lexmark lacks software but gives you better speed, 600 by 600 resolution, and the ability to print banners.

Given its modest feature set, the SuperScript 150C makes the most sense perhaps as a spare unit for kids. If you're buying one printer for the house, the 750C is vastly preferable if you can shell out the additional $80.

—Jim Heid ▶

SuperScript 750C

PRO: Superb photo output, easy to use.

CON: A bit bulky, doesn't make banners.

VALUE: A great price/performance choice.

Street price: $199 (after $30 rebate, through 1/4/98)

SuperScript 150C

PRO: Basic color printing at a rock-bottom price.

CON: Slow, must swap cartridges.

VALUE: A budget choice for kids or as an extra printer.

Street price: $119 (after $20 rebate, through 1/4/98)

NEC Technologies

800/632-4636

www.nec.com

READER SERVICE NO. 787

QUICK TAKES

3D Logo Tricks

"COOL" MAY BE the most overused adjective in the computer world, but Ulead's Cool 3D really deserves its moniker. It's tough to imagine a more foolproof 3D logo package than this $49.95 utility. Without consulting the program's manual, you can create a slick animated logo in minutes: Just type the desired text; dress it up with ready-made colors, textures, and motion effects; and you're done. You select these items by dragging and dropping them from a palette that shows thumbnail previews, so there's never any guesswork about effects. Creations can be saved as bitmapped still images or as GIF or AVI animations, ready for use in presentations, Web pages, and other documents. The only catch is that Cool 3D handles only text, not free-form graphical objects. Ulead Systems; 310/523-9393; www.ulead.com.

READER SERVICE NO. 788

—Harry McCracken

Their eyes met from across a crowded city.

Ever talk face-to-face from a hundred miles away? You can. With the Intel Create & Share™ Camera Pack,† you can call and see your loved ones on your PC. Or other video phone users. Want more? You can also record and send a video clip on an e-mail postcard in minutes, take quick snapshots, even stretch your face with photo manipulation software. Where will you find it? At computer retailers in your crowded city. Visit our Web site to find out what you need, where to buy, and how to use the Intel Create & Share Camera Pack. ► www.intel.com/createshare

Includes video phone, e-mail postcard, photo manipulation software and more.

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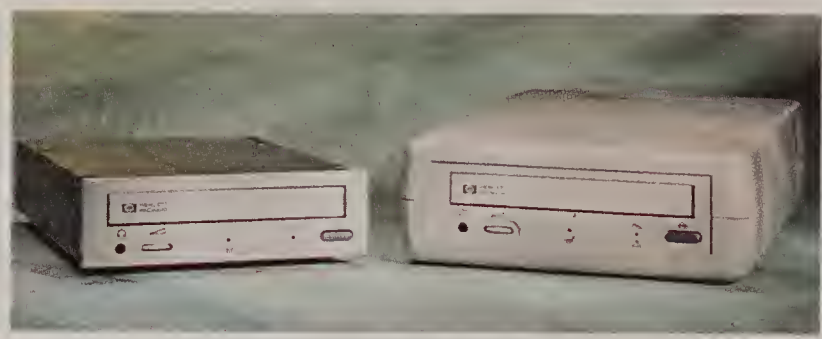
©1997 Intel Corporation. Simulated video phone image. Interface enlarged to show detail. Actual performance will depend on hardware and software configurations as well as the quality of the telephone or ISP connection. †To make a connection, both parties need video phone capabilities. To send and receive e-mail postcards, an Internet connection and mail package supporting file attachments are required. Visit our Web site for system requirements.

Smart Storage: HP's CD-Writer Plus 7110

CD-REWRITABLE

DRIVES THAT can both read and write to CD-ROMs used to be finicky and expensive, but that's all changing. Hewlett-Packard's **SureStore CD-Writer Plus 7110** is a case in point: This CD-Rewritable drive, which reads at 6X and writes at 2X, pulls away from the competition by integrating some new technologies.



DO A REWRITE: HP's versatile SureStore CD-Writer Plus 7110 handles CD-ROMs and rewritable discs and plugs into a parallel port.

The 7110 plays standard CD-ROMs and audio CDs, writes to audio or data CD-Recordable media, and works with fast rewritable discs that hold up to 640MB and work just like floppy disks. At about $30 per disc (compared to about $5 for CD-R media), CD-RW may seem expensive, but on a per-megabyte basis it's the lowest-cost media around. (One drawback: Not every CD-ROM drive can read CD-RW media, so if you plan to swap the discs with other people, check out their drive specifications.)

As with any CD recorder, you can use the 7110 to create a standard CD-ROM by filling the whole disc at one time. But the bundled Adaptec DirectCD "packet-writing" software offers an intriguing alternative. You can drag and drop data to a CD-R disc, one file or folder at a time. When everything you want is on the CD-R, a wizard pops up and quickly converts it to a standard disc that any CD-ROM drive can read. It's a great way to keep a running backup archive of your essential data.

The frosting on the cake: The $610 external version of the 7110 plugs into a PC's parallel port, so there's no need for the SCSI interface that other CD recorders use. (The $499 internal version has an EIDE interface.) I was skeptical of the rated performance, but the early prototype of the external 7110 I tested—which was helped along by a sizable 750K memory buffer that kept the data flowing—had no problems creating discs.

The 7110 ships with all the components and software you need, including DirectCD, Live Pix (a photo-collage package), and one CD-RW disc. The 7110 makes a standard CD-ROM drive seem like ancient technology.

—Stan Miastkowski

SureStore CD-Writer Plus 7110

PRO: Easy installation, versatile software.

CON: CD-RW discs aren't compatible with all CD-ROM drives.

VALUE: Expensive but extremely useful.

Hewlett-Packard Co.

800/826-4111, 970/635-1500

www.hp.com/go/cdr

List price: internal $499, external $610

READER SERVICE NO. 789

Creative Labs' DVD Kit: Second Time's a Charm

DVD-ROM

CREATIVE LABS' second-generation DVD-ROM drive kit offers better performance than its predecessor and is street priced at a palatable $380. The new **PC-DVD Encore Dxr2** kit features superb video and audio—the main reason you'll want to play with the new multimedia technology.

The first DVD-ROM drives had lousy CD-ROM performance, often equivalent to 4X speed. Creative Labs' first $499 PC-DVD drive suffered from mediocre video quality as well, and you couldn't connect it to a television set.

But the new Encore kit fixes almost all the older kit's inadequacies. I used a shipping version. Testing with CD-Tach benchmarks, I found that the Encore drive (made by Matsushita/Panasonic) has double the data transfer rate of the older model—equivalent to an 8X–20X CD-ROM drive. Its 110-millisecond access time is much faster and nearly on a par with that of a high-end 12X–24X CD-ROM drive.

The Encore Dxr2 isn't perfect, though: I noticed an occasional hiccup (for example, a game would slow down) as the drive worked with the data residing on outside tracks. But it can read all disc formats, including CD-Recordable and CD-Rewritable.

New technology incorporated into the Encore kit's PCI MPEG card means you'll see dramatically improved video quality. The card has both S-Video and composite video outlets, so you can connect to your television to watch DVD-Video movies.

Installing the Encore is not a task for the squeamish. One headache you'll likely experience is trying to find the right audio cables for your drives. The kit comes with two of them—one to connect the DVD-ROM drive and MPEG card, and the other to connect the MPEG card to your sound card. But the plugs on these cables may not work with your sound card, since there are many plug/cable combinations. You may need to take both cards to a computer store to find the right combination.

—Jeff Sengstack ▶

PC-DVD Encore Dxr2

PRO: Excellent video and sound.

CON: Audio connections are tricky.

VALUE: Competitively priced.

Creative Labs

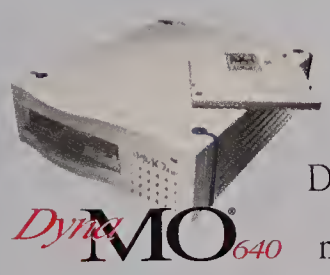
800/998-5227

www.creativelabs.com

Street price: $380

READER SERVICE NO. 790

IS THIS JAZ OR THE *hustle?*



Once you get past the cute name and trendy packaging, the only thing Jaz® users have left is a thinner wallet. Good thing there's DynaMO® 640 removable storage from Fujitsu. DynaMO 640 is much more durable because it's magneto-optical (unlike Jaz). It lets you save your work on different media capacities ranging from 128MB to 640MB (unlike Jaz). You get free tech support (unlike Jaz). And it's less than half the cost of Jaz media,* with a 640MB cartridge going for only $25. (Bye-bye Jaz.) There's also our No Excuses™ policy: Our promise that in the unlikely event your drive fails within warranty period, you'll get a replacement drive in two business days. For more details, without the hustle, call, or visit our website.

(888) 561-2035 www.fcpa.com

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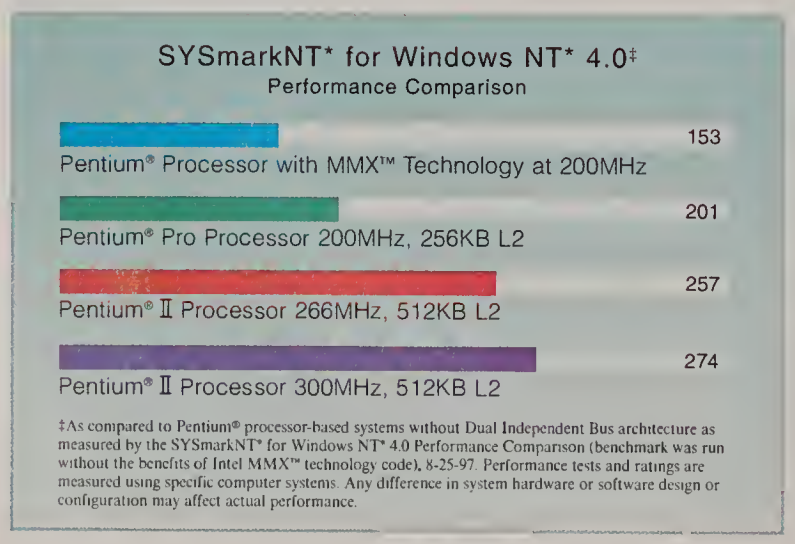

► www.intel.com/PentiumII

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Microsoft
Excel 97
NEW!
VXTREME
webtheater 2
COREL
DRAW 7
Productivity, Power and Precision!
Adobe PageMaker 6.5
Unicenter
InDX
Visual Business Suite
CosmoPlayer 2.0
Jasmine
LOTUS
Word Pro
Microsoft
Word 97
NEW!
ConceptCAD
Microsoft
PowerPoint 97
NEW!
WEB 3D
SUPERCEDE
DATABASE EDITION

PowerTrip: Brawny Notebooks, Slim Prices

NOTEBOOK

POWER COMPUTING, known until recently for its Macintosh clones, is moving into the mobile PC market with a line of Pentium MMX notebooks. And the company's first Intel-based products are priced to kill: The high-end PowerTrip notebooks cost considerably less than Toshiba's Tecra and IBM's ThinkPad portables. If performance and features are more important to you than traveling weight, the PowerTrip notebooks are an affordable choice for a desktop replacement system. The only sticking point is that Power Computing has an uncharted track record for notebook reliability and service.

I tested a shipping version of the **PowerTrip 233/13.3,** which uses the mobile Pentium MMX-233 processor. The $4599 notebook stands up well in a point-by-point features comparison to Toshiba's $6449 Tecra 750CTD, the $5459 IBM ThinkPad 770, and Gateway 2000's $4899 Solo 9100. All four notebooks come standard with 32MB of RAM, a 13.3-inch active-matrix screen, a 3GB-plus hard disk, and a 12X–20X CD-ROM drive. The PowerTrip and Tecra both come with built-in 56-kbps modems, which leaves your PC Card slots free. (The ThinkPad 770's modem isn't built-in.)

ON A POWERTRIP: Power Computing's high-end notebooks deliver lots of features and performance for the price and have great displays.

As for speed, the PowerTrip achieved a PC WorldBench score of 236—second only to that of the Gateway Solo 9100, the fastest notebook we've ever tested, with a score of 242. The PowerTrip's score is nearly identical to the average for PMMX-233 desktops.

This 10-pound luggable comes standard with both internal floppy and 12X–20X CD-ROM drives; the weight is a trade-off against the inconvenience of toting (and sometimes forgetting) external drives. The PowerTrip also has comfy 4-inch wrist rests on either side of the touchpad. The vibrant active-matrix screen, which displays up to 65,536 colors at 1024 by 768 resolution, will appeal to people doing graphics work—the crowd that knows Power Computing's products best.

However, the one-year warranty on parts and labor is not generous; IBM, Toshiba, and many other companies provide a three-year warranty. Power Computing offers tech support 11 hours per weekday and 6 hours a day on weekends. If the PowerTrip stumbles during the first year, you can ship it back for free to Power Computing, shipping and handling included.

—Susan Silvius

PowerTrip 233/13.3

PRO: Fast, with gorgeous screen, internal floppy and CD-ROM drives.

CON: One-year warranty is below average.

VALUE: Appealing price but unproven reliability and service.

Street price: $4599

Power Computing

800/527-0642

www.powercc.com

READER SERVICE NO. 791

InnerBay Zip Drive Fits in a Notebook

ZIP DRIVE

IOMEGA ZIP disks, which aren't much bigger than regular floppies and hold 100MB of data, just became more useful: Owners of some popular notebook PCs can now buy modular Zip drives made for those machines. CNF's $299 **InnerBay Zip Drive** fits into the notebook bay that's made for removable CD-ROM and/or floppy drives (and in some cases, docking stations).

Since modular bays vary in size, you need a drive that fits your notebook. At first, CNF plans to ship versions for certain Compaq, IBM ThinkPad, and Toshiba Satellite and Tecra portables. Other models should be out by the end of this year, the company says.

I was up and running quickly with the preproduction drive I tried out with a Toshiba Tecra 720CDT notebook. I just took out the Tecra's CD-ROM drive, slid in the InnerBay unit, and ran a program that installed all necessary drivers and Iomega's Zip Tools utilities (which allow copying of files and backups). The drive is fast enough to run all but the most demanding multimedia apps from Zip disks.

The InnerBay costs about twice as much as a conventional Zip drive. But if you already use a Zip drive and have a compatible notebook, the InnerBay is a good value. For others, it's an easy way to add storage space or to back up notebook data.

—Yardena Arar ▶

InnerBay Zip Drive

PRO: Lightweight, modular storage for portable PCs.

CON: Works only with selected notebooks.

VALUE: Especially useful if you have a desktop Zip drive.

CNF Inc.

800/826-3462

www.cnfinc.com

Street price: $299

READER SERVICE NO. 792

TACKLING LEADING ISSUES IN NEW TECHNOLOGIES ~ VERSION 1.0

We're giving you more control over your clients and servers.

In a world of rapid change, control can mean the difference between a business thriving and merely surviving. The more control a company has over its desktops, the more agility it has to move fast, solve problems creatively, and quickly explore new ways of doing business.

Networked computing environments based on the Intel architecture play a critical role in business agility. However, the very traits that make those environments so powerful—the breadth of hardware and software choices, the growth in desktop capabilities, the explosion of the Internet—also make them more challenging to manage and control.

CONTROL CAN MEAN THE DIFFERENCE BETWEEN A BUSINESS THRIVING AND MERELY SURVIVING.

As the leading supplier of new technologies for the computer industry, Intel is committed to delivering solutions.

To start with, we design manageability right into our processors, baseboards, platforms—even our newest EtherExpress™ PRO/100 network adapters. Our **Pentium® II processor** contains self-test and monitoring circuitry that minimize downtime and provide valuable data to management software. Along with instrumentation throughout the platform, Pentium II processors help simplify system management.

Through our **Wired for Management (WfM)** initiative, we're working with other PC

MANAGEABILITY

Intel Tech BUZZ

intel®

MANAGEABILITY

What's the Buzz?

"When deployed in combination with manageable HP Vectra and Net Vectra PCs, and leading desktop management tools, we anticipate that the WfM specification will enable organizations to significantly reduce PC ownership costs."

John Gannon, GM Commercial Desktop Div., Hewlett-Packard Company

"Highly manageable, WfM-enabled PC platforms, combined with system software solutions and good technology management practices, should help customers significantly lower their cost of ownership."

Eric Harslem, Sr VP Products & Tech. Strategy, Dell Computer Corporation

"Through our IBM/Intel Advanced Manageability Alliance, we are working to define industry standards, and are already shipping robust WfM-enabled IBM PCs with IBM Wake on LAN™ technology. This helps our customers to lower the cost of managing their networks."

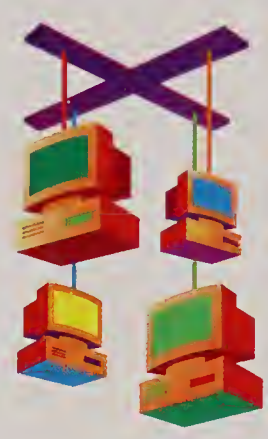
Anne Gardner, VP Commercial Desktop Systems, IBM

"The features, services, and partnerships associated with Compaq's Intelligent Manageability, along with the baseline WfM capabilities, continue to lead the industry in the delivery of standards-based, manageable PCs that reduce the total cost of ownership."

Tim Harris, VP Desktop PC Division, Compaq

intel®

industry leaders to ensure that Intel architecture environments offer not only the most powerful array of business capabilities, but the most manageable. We've spearheaded an industry-wide effort to develop guidelines for a new generation of platforms—designed from the ground up for manageability—to be centrally managed over the network. Now, systems based on those guidelines are coming to market, and they deliver a rich set of capabilities for managing and controlling the computing environment.



With our **LANDesk® Management Suite**, we offer a comprehensive set of software tools that can automate tasks ranging from software distribution and virus protection to inventory control and asset management. LANDesk family products also provide remote management features that help IT reduce total cost of ownership (TCO) and increase agility by automating and centralizing management functions.

Manageability rests on more than just products—but products are a good start. By deploying PCs, Net PCs, and servers based on the Pentium II processor and the Wired for Management baseline, companies are better positioned to increase manageability. Add industry-leading management software such as the LANDesk family, and companies are further able to reduce their total cost of ownership, enhance business agility, and thrive in a world of ongoing change.

Manageability is just one element of business agility. Watch for future *Tech Buzz* issues to bring you up-to-date information on other ways to make your business more agile.

Wired for more control.

Wired for Management-capable PCs and Net PCs can help your IT organization increase service levels, reduce support costs, and boost the ability to deploy new capabilities quickly. They do this by enabling down-the-wire remote management that delivers benefits in four key areas:

Asset management. Built-in instrumentation lets systems identify themselves to management software, and provides a wealth of data for inventory control and asset management.

Off-hours and remote maintenance. Remote boot and remote control capabilities can "wake up" a PC and install or upgrade software, without disrupting the user and without a technician's involvement.

Initial system configuration. A service boot feature allows unattended installation of new systems, including installing the OS and user software.

Remote problem resolution. Support techs can take over a system remotely, increasing first-call resolution rates and minimizing the need for "house calls." Hardware monitoring and alerting heads off many problems.

The net effect? Network uptime, user satisfaction and business agility go up. Support costs and TCO go down.

www.intel.com/techbuzz

This is just a glimpse of the technologies behind increased manageability. For more detailed information, visit our Web site.

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A Photography Pro: Kodak's DC210 Zoom

DIGITAL CAMERA

IF YOU WANT a digital camera that offers point-and-shoot simplicity, captures absolutely top-quality images, and includes an excellent software bundle, consider Kodak's new **Digital Science DC210 Zoom.** Although it costs $899, several unique features make it a strong choice for businesspeople who want to add photos to documents, presentations, and Web pages, as well as for home users investing in above-average digital photos.

KODAK'S VERSATILE DC210 ZOOM: High-quality images and a very useful LCD screen make this camera worth its high $899 price.

The DC210 features a 2X (29–58mm) zoom lens, automatic flash, and a 1.8-inch LCD screen that provides the best viewing features of any digital camera I've used. Among the LCD's slick tricks are colorful icons depicting a trash basket, a magnifying glass, and file folders. The LCD also displays a scrollable "film strip" of all pictures stored in the camera; you can zoom in on any image. The LCD controls for changing resolution and quality mode are easy to read in the field.

The DC210 shoots high-resolution images in three compression modes—good, better, and best—and uses removable memory for storage (it comes with a 4MB CompactFlash memory card, and also supports 2MB and 10MB cards).

Depending on the compression mode, the DC210 can store from 12 to 31 shots at 1152 by 864 resolution, or 24 to 59 shots at 640 by 480 resolution. It's also the first digital camera I've seen that stores images in either JPEG or FlashPix format.

You can download the DC210's images to your PC using a standard serial or infrared connection. Or use its video output connector to view shots on a television set—especially handy for presentations. My preproduction unit performed without a hitch, producing strikingly handsome images on screen and in print. My only complaint: You must use the LCD when shooting close-ups, which shortens battery life.

The software bundle includes Adobe's PhotoDeluxe 2.0 and PageMill 2.0, Kodak's Picture Easy 2.0 and Picture Postcard 1.0 (for creating e-mail "postcards"), and TWAIN drivers.

The DC210 is costly, but it's a good investment for those who can afford it.

—Richard Jantz

Digital Science DC210 Zoom

PRO: High-resolution images, versatile features.

CON: Close-up shots shorten battery life.

VALUE: Pricey, but great quality for the most demanding jobs.

Eastman Kodak Co.

800/235-6325

www.kodak.com

Street price: $899

READER SERVICE NO. 793

A Lower-Cost Option: Yashica's KC 600 Camera

DIGITAL CAMERA

STREET PRICED AT $549, Yashica's **KC 600** digital camera is neither the least expensive nor the most sophisticated of its lot. This compact, dependable device looks a lot like today's point-and-shoot cameras and seems best suited for beginners and families.

The 9.9-ounce Yashica KC 600 is very easy to use. I tested a shipping unit. This digital camera has a fixed-focus 6.5mm lens and a 1.8-inch LCD screen for shooting and viewing photos. There's also a self-timer and a built-in flash with red-eye reduction.

The Yashica's image quality was similar to that of the $399 Epson PhotoPC and $599 Olympus D-200L digital cameras. The KC 600 comes with a 2MB CompactFlash memory card (like the Olympus and unlike the Epson, which has a 1MB card). The Yashica camera weighs about 17 ounces less than the Epson unit.

My only complaints: As with some other digital cameras in this price range, some photos taken indoors or in low light can appear slightly dark even with the flash. (You can touch them up with the bundled PhotoSuite SE photo editing software by MGI.) Also, you can't attach accessories such as filters or a wide-angle lens.

The KC 600 runs on four AA batteries. Its 2MB CompactFlash memory card stores 37 standard photos at 640 by 480 resolution, or up to 80 photos at lower resolution.

Downloading photos to my PC was no problem using the supplied serial cable. The camera also comes with a video cable for viewing photos on a TV set, as well as a PC Card adapter for notebook PCs.

—Grace Aquino ▶

KC 600

PRO: Compact and easy to use.

CON: Some indoor and low-light pictures look dark.

VALUE: A good choice for novice digital photographers.

Yashica

800/526-0266, 732/560-0060

www.yashica.com

Street price: $549

READER SERVICE NO. 794

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Easily import any frame of video captured by Sony's DCR-PC7 Digital Handycam® Camcorder to your PC with virtually no loss in image quality.**

17" VAIO 220VS Multimedia Trinitron Display gives you the biggest picture (16" viewable) and Graphic Picture Enchancement (GPE) makes it all perfectly clear.

For more info: 1-888-552-7669 or www.sony.com/creativity

Whatever your passion, pursue it with a Sony VAIO Tower PC. Care to become an expert on plastic flamingos? Just beam the shots of your collection from your Sony Digital Camera to your PC, and use your Trinitron display to organize them by shades of pink. Perhaps conduct a little field research with your camcorder for inclusion in a whirligig website or multimedia presentation. Or host the first-ever video conference on lawn gnomes. Why not, you've got the preloaded creativity software to do all that, and then some. Better still, you've got the ultimate multimedia PC to do it all with. So pick your path and go. There are no wrong answers. Once you go with the right system.

VAIO

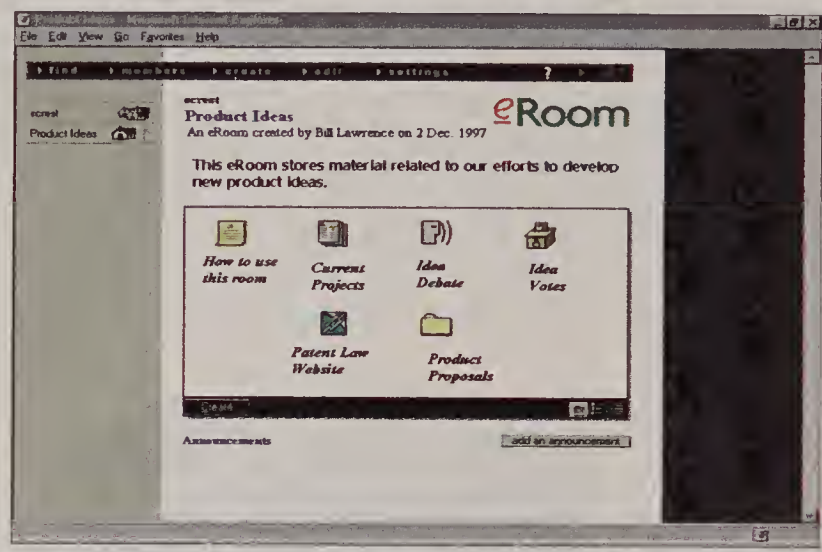
SONY

eRoom: Easy Workgroup Web Collaboration

GROUPWARE

"GO TO YOUR ROOM" used to mean you were in trouble. But Instinctive Technology's **eRoom,** a promising new application, could keep you and your workgroup out of trouble. I tested a preproduction version of this affordable Web-based package, which allows colleagues connected to the Internet or a company intranet to work jointly on documents, hold discussions, and collect and organize any type of electronic information. This groupware program uses a metaphor that everyone instantly understands: compartments, or "rooms."

Give each room a name to correspond with a project or an information category; you can then use the appropriate room to house the pertinent files, discussions, announcements, and Internet links. A version-control applet allows colleagues to retrieve and update documents. You can drag and drop files between your browser and your desktop. A clever polling applet lets you put an issue to a vote, so your team can make and document decisions electronically.



INSIDE AN EROOM: Instinctive's Web-based eRoom lets your team organize work into "rooms" to store discussions, links, and files.

Be aware that eRoom makes heavy use of ActiveX, the Microsoft technology that runs applets with the company's Internet Explorer browser (eRoom isn't yet compatible with the new IE 4.0, but an update is planned by December). Because Netscape Navigator doesn't support ActiveX natively, Instinctive provides a third-party plug-in for use with that browser. One other drawback: You have to download and install about 5MB of software, so you can't walk up to any PC and go to your room instantly.

The eRoom software costs $129 per user license; Instinctive Technology is also offering promotional group discounts through December 15, 1997: 25 users for $2995, or 50 users for $4995.

Without enterprise-oriented features like e-mail, replication, and customizable applications and forms, eRoom isn't in the same league with Lotus Notes. But if you want easy, effective collaboration on the Web, think about stepping into eRoom.

—Bill Lawrence

eRoom

PRO: Easy group collaboration on the Web.

CON: Requires Web browser with ActiveX support.

VALUE: Affordable and effective.

Instinctive Technology Inc.
617/497-6300
www.instinctive.com
Street price: $129 per user; group discounts are available through 12/15/97

READER SERVICE NO. 795

A New Intranet Option: Microsoft's Free Kit

GROUPWARE

YOUR WORKGROUP needs to share information online with a basic intranet. Microsoft's new **60-Minute Intranet Kit** has one big advantage: It's free if you're using a combination of Microsoft Office 97, Microsoft FrontPage 98, and a Web server running the FrontPage 98 Server Extensions. This kit provides a set of templates, along with detailed instructions on how to set up an intranet, all downloadable from www.microsoft.com/office/intranet/. The catch is, you must have those *particular versions* of the Microsoft products for the templates to work. I downloaded and used the shipping version of the kit.

To start setting up your intranet, look at Microsoft's 12 predesigned modules. Though they won't help everyone, they could help with some common demands, such as sharing project information among groups, delivering product information to a field sales force, or simplifying document revisions and approvals. They're all organized by task.

You can also mix and match templates. A simple intranet might have a few linked Web pages and a search feature. A more complex site could include links to a database for managing information. One interesting option, the News Module, allows workgroup members to send out news using Internet Explorer 4.0 and a push channel.

It's understandable that you need Microsoft software to use this free kit, but you may not be willing to upgrade to the necessary versions. For example, the required FrontPage 98 was in beta form at press time, with a planned ship date of mid-November. (Microsoft still offers an older version of the intranet kit that works with FrontPage 97, but it doesn't include the same templates.)

—Paul Heltzel ▶

60-Minute Intranet Kit

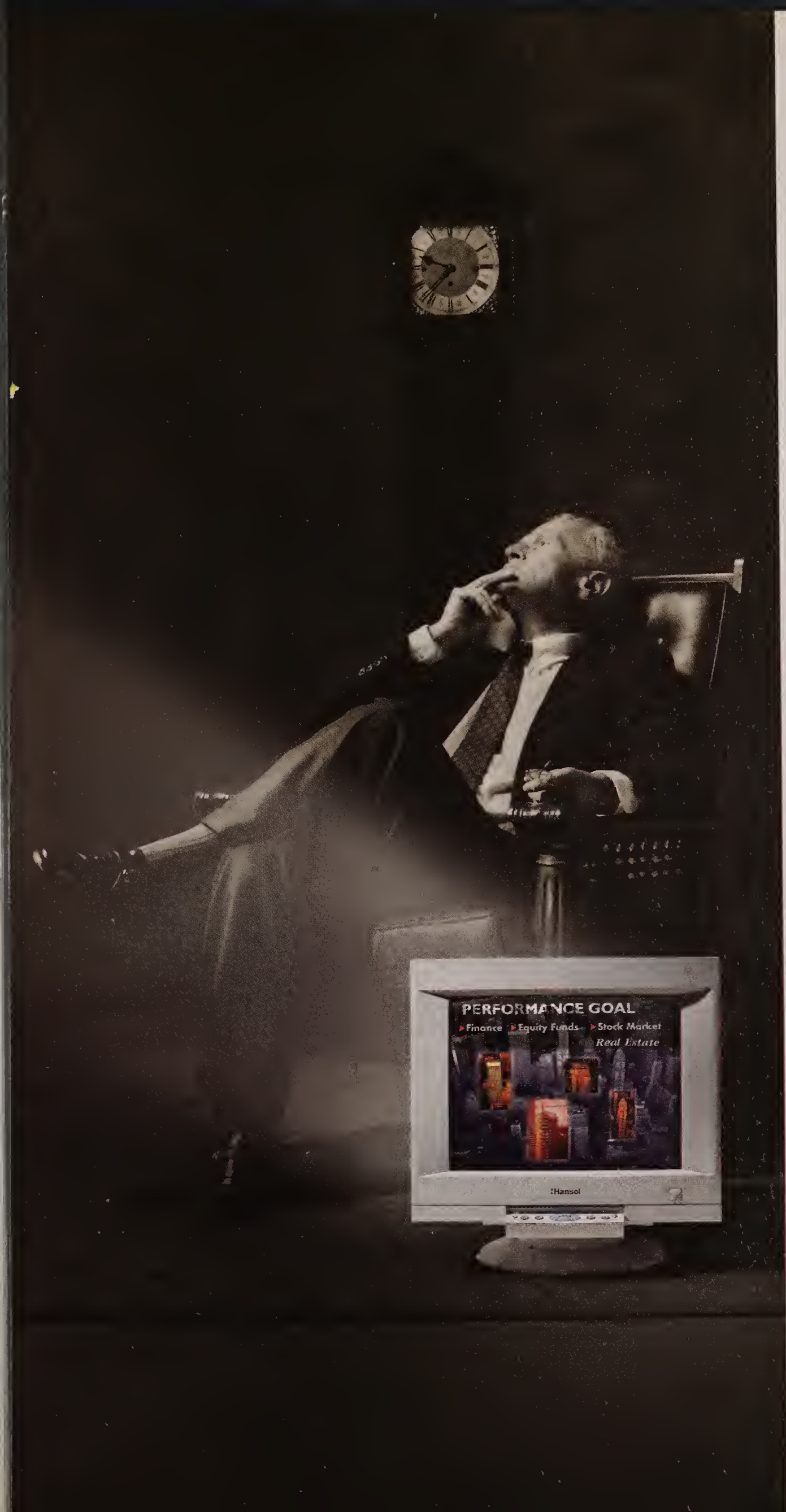
PRO: The price is right.

CON: Requires latest versions of Office and FrontPage.

VALUE: Worth checking out if you already use Office 97.

Microsoft Corp.
206/882-8080
www.microsoft.com
Price: Free download

READER SERVICE NO. 796



Robert Schienberg plans hostile takeovers for a living. But at least his monitor is user friendly.

When Robert Schienberg plans a corporate takeover, he has a lot to think about. Profit and loss statements, price/earnings ratios, product potential, and much more.

But the one thing he doesn't have to think about is the monitor he uses to do it all on. The Hansol 700P (15.7" viewable). Its .26mm dot pitch really helps him see clearly. While its quick set-up, drop down control panel with 20 on-screen settings, modern design, reliability, and simplicity of operation, can't help but make his life a little bit easier.

Designed for Microsoft Windows 95

So whether you're planning a takeover or a makeover, downsizing or upgrading, get the monitor that treats you like a friend.

After all, you never know when you may need one. Especially if you're Robert Schienberg.

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Ditto Max Grows With You

BACKUP DRIVE

CHOOSING THE right backup drive can seem as tough as picking lottery numbers. With hard drive capacities jumping from an average of 2GB a year ago to 4GB today—and perhaps to 8GB next year—it's hard to choose an affordable backup unit that won't soon be outdated. You could buy for the future with a fast 8GB Travan-4 tape drive, but you'll pay about $400 for the drive and another $35 per tape—too much if you're backing up only 2GB or 3GB now. Iomega has a novel solution with its new $199 **Ditto Max** and $299 **Ditto Max Professional** drives.

The Ditto Max's unique tray feed handles cartridges that hold up to 3GB, 5GB, or 7GB of compressed files; the Ditto Max Professional also accepts 10GB cartridges. The drives, which were not ready for testing at press time, come in identically priced parallel port or internal floppy-connect models. A 3GB cartridge for the Ditto Max drives costs $20; you'll pay $26 for a 5GB tape, $30 for 7GB, and $35 for 10GB. This flexibility means you don't waste money: As your hard drive fills up, you can then buy larger tapes.

Iomega also bundles a new version of Ditto Tools 1-Step, a backup program that sets up a 125MB fast direct-access area at the start of each tape, to archive frequently used files. Iomega says the internal models can transfer up to 36MB per minute when used with its $49 Ditto Dash card; parallel port drives back up at 19MB per minute. Of course, neither model can match the 60MB-per-minute transfer rate of an EIDE or SCSI Travan-4 drive.

—Rex Farrance ▶

THIS BACKUP DRIVE WON'T SOON BE OUTDATED: Iomega's tray-feed Ditto Max drive accepts 3GB, 5GB, and 7GB cartridges.

Ditto Max, Ditto Max Professional

PRO: Inexpensive, accepts multiple tape capacities.

CON: Not as fast as 8GB Travan-4 EIDE or SCSI tape drives.

VALUE: A smart, flexible choice for tape backup.

Iomega

800/697-8833

www.iomega.com

Street price: Ditto Max (with one 7GB tape) $199, Ditto Max Professional (with one 10GB tape) $299

READER SERVICE NO. 797

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Bragging Rights - email some shots of your skydiving videotape to the grandkids

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Posterity - preserve images of your kids now, so when they become teenagers you can remind yourself of how sweet they once were

Preservation - keep your marriage and your job - videoconference with the office while you relax poolside on vacation

Reinforcement - collect news clips on global warming for your upcoming address to the United Nations

Surveillance - monitor the cookie jar - from midnight to 6 am

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Introducing Zipshot - It makes capturing images and video from your TV, VCR, camcorder or digital camera a cinch.

Unlike other capture devices, ArcSoft's "Zip-Along™" technology means no more plugging, unplugging and rebooting. Just connect Zipshot to your PC's parallel port - along with your printer and other parallel devices - attach your video source and you're ready to capture. In seconds you've got crisp, clear, full color stills in resolutions of up to 1600x1200 pixels.

Better yet, try something totally cool - save motion video clips as AVI files to enhance your business presentations or spice up your email.

Zipshot is TWAIN-compliant and supports most popular file formats. Plus, it comes with seamlessly integrated easy-to-use software.

Friendly User-Interface

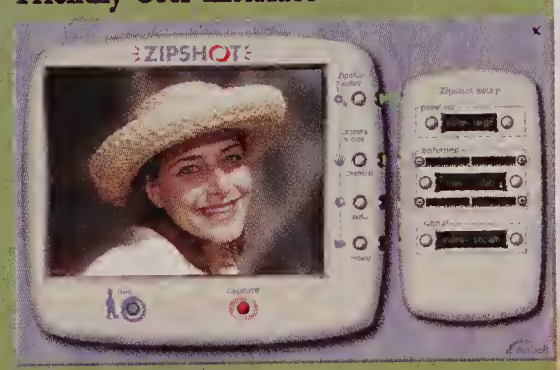
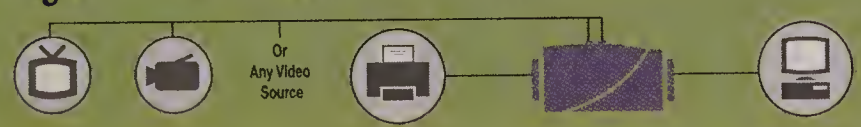


Diagram of Connections and Printer Pass-Thru



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Create & Share Pack: Conferencing and More

VIDEOCONFERENCING

INTEL HAS cooked up a videoconferencing package with valuable image and video editing software. The three flavors of its **Create & Share Camera Pack,** though a little pricey, should please beginners.

Each pack provides a small video camera and a software bundle. The $199 version is for use with a Pentium MMX system equipped with a Universal Serial Bus port. I tested a prerelease version of the $299 package, for a Pentium-90 or better machine with a free PCI card slot. For $399, Intel adds a 56-kbps modem. You will also need a sound card and a microphone.

SCENE RECORDER: Intel's Create & Share Camera Pack has great software.

With the included Intel Video Phone software, I could communicate with any software that meets the H.323 videoconferencing standard. While the images look fine, quality ultimately depends on Internet traffic and your connect speed. With dial-up connections, motion was jerky—okay for family use but not great for business. An ISDN line worked better.

The $299 version's video capture card can't grab full-screen, full-motion video, but it delivered solid, 15-frames-per-second captures at a movie size of 320 by 240 pixels—ideal for Web site movies.

The excellent software includes MetaCreations' Kai's Power Goo, for morphing; PictureWorks' PhotoEnhancer, for retouching; NetCard, for e-mailing images; and Intel Scene Recorder, for making Video for Windows movies.

—Jim Heid

Create & Share Camera Pack

PRO: Easy to set up, good software bundle.

CON: As always, image quality depends on Internet connection.

VALUE: Not the least expensive choice, but well done.

Intel Corp.

800/628-8686

www.intel.com/createshare/

Street price: $199 to $399

READER SERVICE NO. 798

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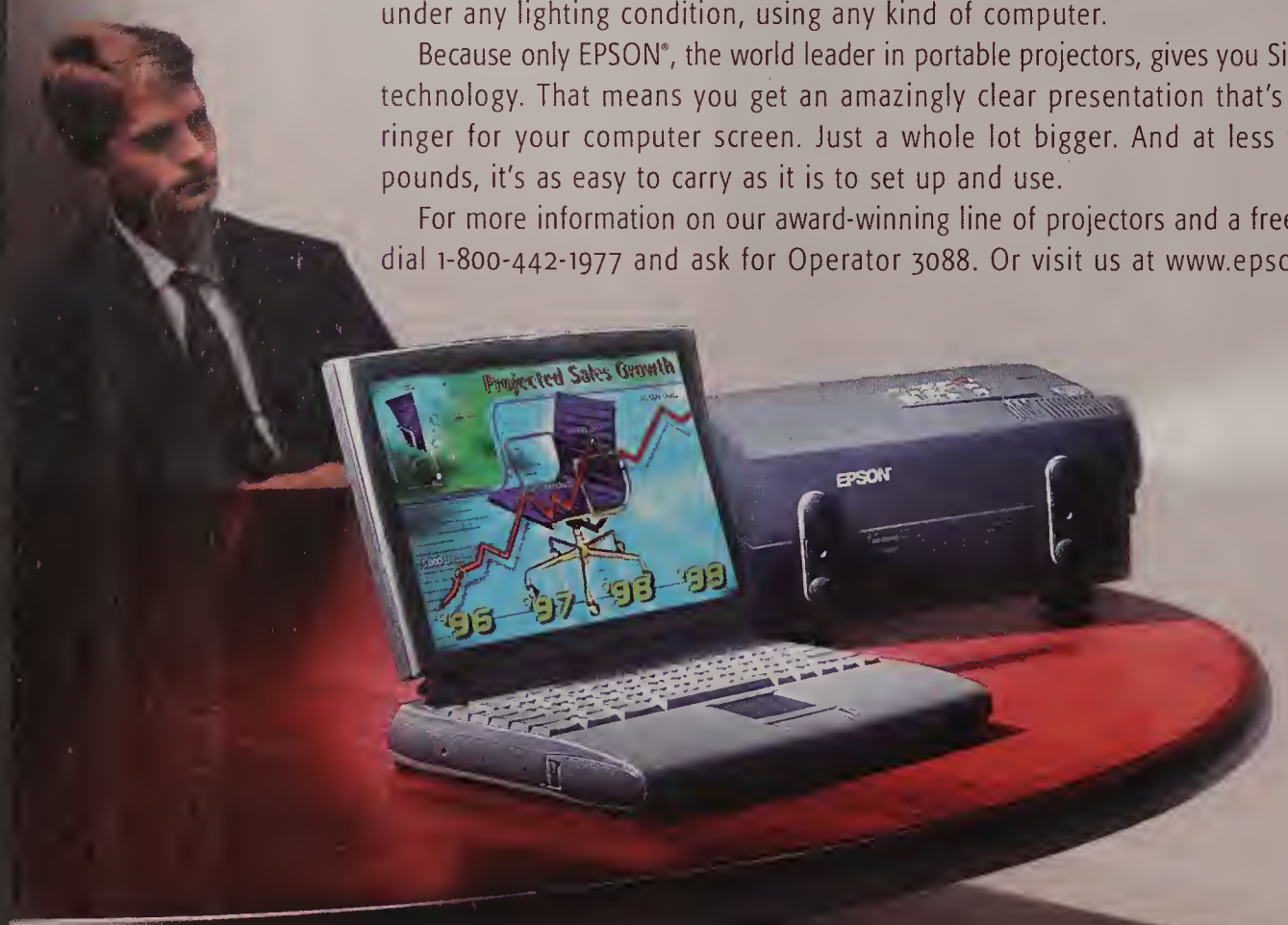

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SmartWheel: IntelliMouse Gets Out of Its Trap

UTILITY

I'VE HAD A love/hate relationship with the Microsoft IntelliMouse, the input device bundled with Office 97 that features a built-in scroll wheel. I love the IntelliMouse's vertical and horizontal scrolling capability because I can navigate quickly through long documents and take the stretch out of multiple-screen spreadsheets, simply by turning the wheel. With its pan-scrolling feature, I can zoom down long Web pages without having to click and hold side-screen scroll bars.

But love at first sight quickly turned to frustration when I realized that the IntelliMouse works with Microsoft's Office 97 and Internet Explorer—and little else. Fortunately, Insight Software Solutions' **SmartWheel** gets the IntelliMouse out of its trap. This small add-on program, which I tested in shipping form, enables the device to work with most 16- and 32-bit Windows 95 and NT 4.0 applications. So now my IntelliMouse works with Netscape Navigator as well as with Internet Explorer. I can examine every sector of a graphic whose full size is larger than one computer screen. The $15 SmartWheel package also adds pan-scrolling ability to the middle button of a conventional three-button mouse.

I have just one question: Is a SmartWheel salesperson called a "wheeler dealer"?

—*Michael S. Lasky* ▶

SmartWheel

PRO: IntelliMouse is no longer restricted to Microsoft apps.

CON: No real problems.

VALUE: A small price to pay for a useful product.

Insight Software Solutions

801/295-1890

www.wintools.com

Street price: $15

READER SERVICE NO. 799

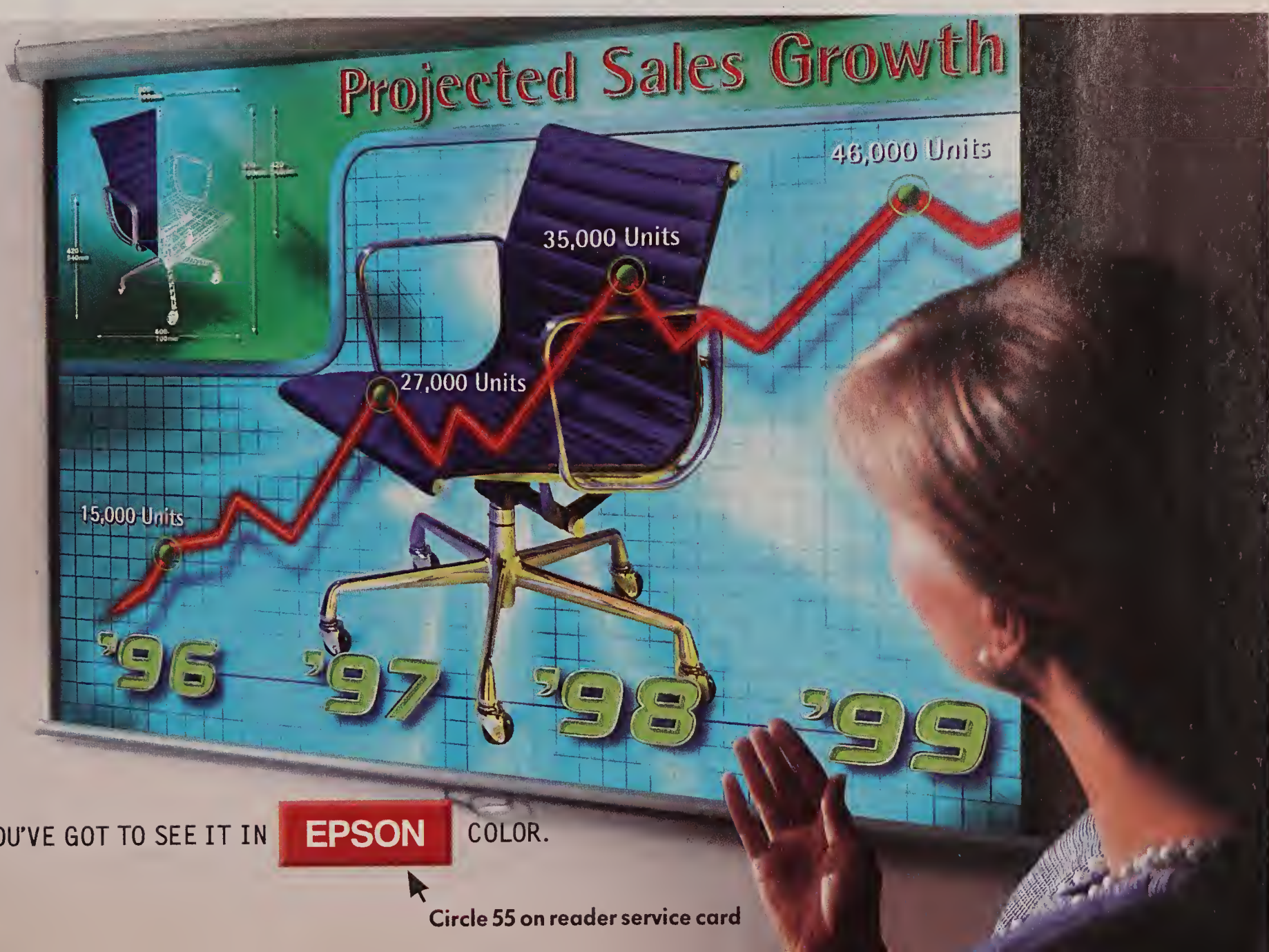
QUICK TAKES

SparQling Storage Option

SYQUEST'S NEW removable-cartridge hard drive, the SparQ, costs $199 and gives you a three-pack of 1GB cartridges for another $99—among the lowest prices in this category. We can't comment on its performance, though: A SparQ drive was not available for testing. The small cartridges (based on SyJet technology) fit in a shirt pocket and are convenient for backups, storing large files, or toting work around. The drive comes in both internal EIDE and external PC parallel port versions. SyQuest Technologies; 510/226-4000; www.syquest.com.

READER SERVICE NO. 800

—*Laurianne McLaughlin*



YOU'VE GOT TO SEE IT IN EPSON COLOR.

Circle 55 on reader service card

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Windows NT®
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Logitech FreeScan: Good Idea but Not Perfect

SCANNER

LOGITECH'S **FreeScan** wants to be two scanners in one. This $299 sheetfed unit has a detachable motorized head for scanning cardboard, books, and materials normally requiring a flatbed scanner. It's a great concept but is practical only for occasional use. I reviewed a preproduction version.

COMBO SCANNER: The sheetfed FreeScan also handles books, but results vary.

Installation with a parallel port cable is simple. (A pass-through port accommodates your printer.) With regular paper, the FreeScan works well. Quality lived up to the specs: 600-dots-per-inch optical resolution (4800-dpi enhanced) and 30-bit color. The large 25-page document feeder frees you up as you scan long documents.

If you're scanning a book or other material that can't be sheetfed, the FreeScan does the job, but not as well as a flatbed model. Here's how it works: You detach the scanner head from the base and position it at the top or side of the book. This head has two roller sets on the bottom that lie on the document. You press a button to start scanning, and the rollers move the head along the page. You must press the button again to stop the scan.

When I tried to scan pages from a couple of books, the head missed the first few lines. When I called the company for help, I learned how to avoid this problem by giving the head a moment to warm up after I pressed the button. Generally, scanning a bound book took multiple tries.

Logitech bundles an attachment for use with small or delicate items, plus Adobe PhotoDeluxe 1.0, Xerox TextBridge, and the DocuMagix PaperMaster software.

—*Yardena Arar*

FreeScan

PRO: Small footprint, 25-page document feeder, offers some flatbed capabilities.

CON: Book scans can be frustrating.

VALUE: This versatile sheetfed scanner is no flatbed replacement.

Logitech
800/732-3039
www.logitech.com
Street price: $299

READER SERVICE NO. 801

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Madison: PCs Can Talk, but You May Not Like It

UTILITY

THANKS TO NEW natural-speech dictation software that lets you speak without pauses, more people are talking to their PCs. Now one company that specializes in speech software thinks computers should start talking back. With **Madison,** the first program from Kurzweil Applied Intelligence since its merger with Lernout & Haupsie, your PC can read on-screen text to you in synthesized speech (at press time, the company advised us that the product's name could change). Unfortunately, the gee-whiz factor is more impressive than the utility itself.

A number of other programs can read text to you, the most notable being the $49 Monologue 97 from First Byte. But Madison, which is street-priced at $40, goes further by integrating itself with Outlook, Microsoft's personal information manager.

When you launch Madison, a taskbar appears across the top of your screen. To have text read to you, you select it on screen and drag and drop it onto the program's taskbar. (Alternatively, you can copy text to the Windows Clipboard and click a button on the Madison taskbar.) Madison dictates in any of seven languages. If you use Outlook, Madison gives status reports on your e-mail and appointments. For example, you can configure the program to tell you every 15 minutes how many unread messages you have in your in-box.

Madison is easy to install and use, but I found the preproduction version I reviewed a bit redundant. If you use Dial-Up Networking in Win 95, you already know when you have new mail whenever you make a connection to your mail server. And I've never had a complaint with Outlook's audio alerts for appointment reminders. Finally, while Madison's synthetic speech sounds as good as its competition, that's faint praise. The sound is mechanical and sometimes hard to understand.

The program would help sight-impaired (but not blind) users. Otherwise, it's far from a must-have for most users.

—John P. Mello Jr. ▶

Madison

PRO: Easy to use.

CON: Speech sounds mechanical, sometimes hard to understand.

VALUE: Of little utility for most people.

Kurzweil Applied Intelligence

617/238-0960

www.lhs.com/kurzweil/

Street price: $40

READER SERVICE NO. 802

You need big cargo space on your computer these days. Certainly more than hard drives or little floppies can offer. Today's multimedia software just fills them up too fast. But a Zip Built-In™ drive gives you unlimited space. And the 100MB Zip disks can handle whatever big nasty file you throw at it. So if you're computer shopping, look for the Zip Built-In logo. It says you've got the capacity to create more, share more, save more, do more. **www.iomega.com**

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With over 8 million out there, Zip is the standard.

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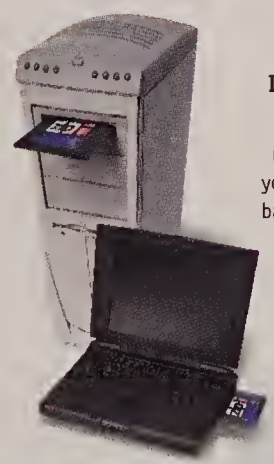

Introducing Zip Built-In.

A Zip™ drive built into your notebook or desktop PC gives you unlimited capacity to store, back up, and share tons of stuff.

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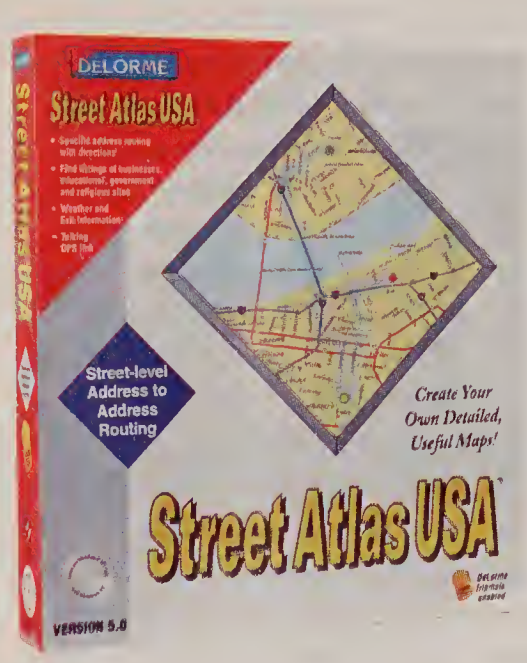
New Version OCT. 1997



1 The Best Maps – The Hottest Features

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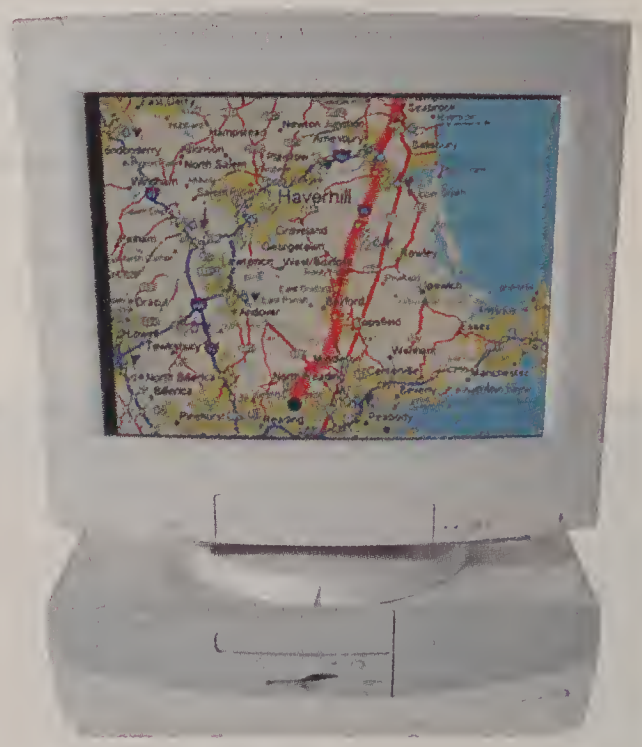

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FreeSpace: Compression Utility Gives You Control

UTILITY

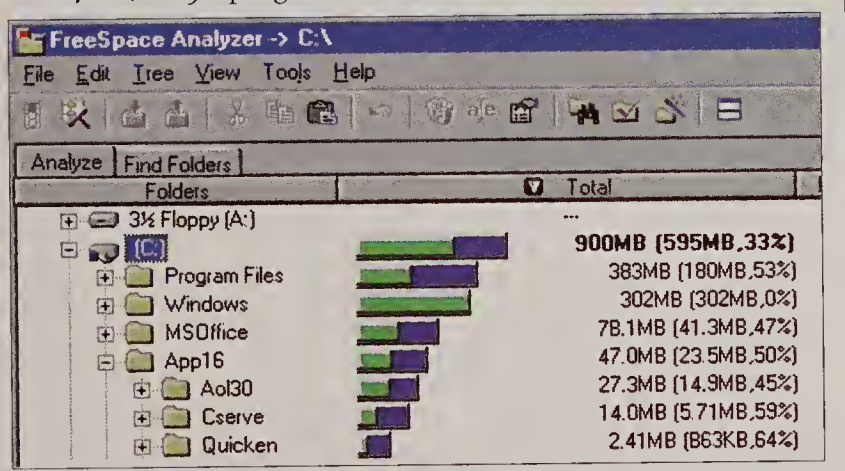
YOU NEED IT. You want it. You must have it. Yep, I'm talking about hard disk space.

Compression is the quick way to fit more on a hard drive, but it can slow down your system and increase the odds of a data disaster. Mijenix's new **FreeSpace,** a $50 program for Windows 95 and NT 4.0, won't totally solve these problems, but it gives you impressive control over compression.

Like WinZip and similar utilities, it compresses only the files you specify. But for Win 95's purposes, FreeSpace keeps files in the original place on your hard drive, and like Windows 95's DriveSpace, it decompresses them on the fly.

To compress, you right-click a file or folder in Windows' Explorer and select the option. Or use one of two wizards to select folders and files. For instance, you can shrink all of your .bmp files (I compressed mine up to 84 percent).

Explorer shows compressed file names in blue. You can still launch a program or copy a file to a floppy while FreeSpace quietly decompresses.



ADD HARD DRIVE SPACE: FreeSpace lets you choose specific files and folders to compress; here it clearly shows the space to be gained.

FreeSpace is a good idea, and it works. It's not fast, but it's probably safe. In my spot tests of a shipping version, loading a 1.55MB worksheet into Excel 97 took about 30 percent longer with both Office and the file compressed. With just the file compressed, it took almost 20 percent longer. With only Office compressed, the file took 13 to 15 percent longer to load. Some people may not want to compress everyday applications for this reason.

As for safety, FreeSpace lets you be prudent: I wouldn't compress vital data I didn't back up often. Overall, FreeSpace is a reasonable choice.

—Lincoln Spector ▶

FreeSpace

PRO: Affordable and flexible for compressing files.

CON: Slows performance a bit.

VALUE: A smart approach and a good choice.

Mijenix

800/645-3649, 608/277-1981

www.mijenix.com

Street price: $50

READER SERVICE NO. 803

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(Digital Safe)

Iomega 100MB Zip™ disks give you the capacity to protect more. Learn more about Iomega Zip drives and disks at: www.iomega.com/ZipIdeas

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Iomega 100MB Zip™ disks give you the capacity to archive more. Learn more about Iomega Zip drives and disks at: www.iomega.com/ZipIdeas

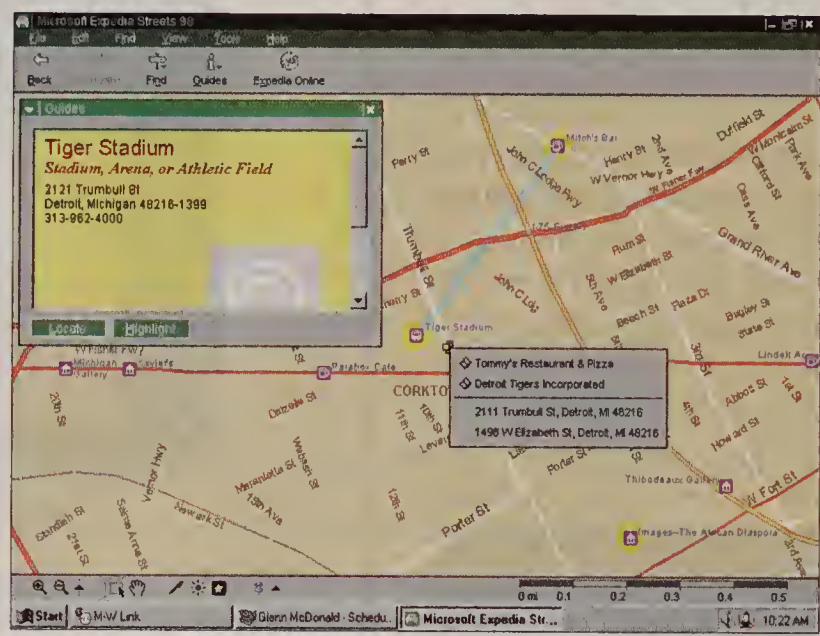
Street Fight: Expedia Streets vs. StreetFinder

MAPPING

I REALLY NEED A mapping package. My sense of direction is so consistently wrong that I often let my intuition point me in one direction, then deliberately head the opposite way. Mapping programs such as Microsoft's **Expedia Streets 98** and Rand McNally's **StreetFinder 98** help put an end to my guesswork.

Which program works best? Based on my tests of shipping versions, you should consider the $50 Expedia Streets if you want a slick interface and online features. If you value address-to-address driving directions, you'll want the $25 StreetFinder.

Expedia Streets and StreetFinder both give you impressively detailed maps (down to street level) of major American cities, with customizable filters for points of interest. Icons represent area restaurants, hotels, banks, public transportation, and so on; click an icon for more details and contact information. If you punch in the name or address of a particular place—your hotel, perhaps—you can print out a customized area map with selected icons.



TAKING IT TO THE STREETS: Expedia Streets 98 is intuitive and includes maps that give drill-down details about an area.

For my money, Expedia Streets 98's interface has the edge. Navigation is so intuitive that I never once had to consult the manual, and the supplementary online and travel itinerary features are never more than a click away.

For online material, Expedia Streets takes you to Microsoft's Expedia Web site, which provides travel information and services such as airline, hotel, and car rental reservations. StreetFinder's online link connects you to the Rand McNally home page, which offers similar but much less extensive services.

However, StreetFinder provides one highly valuable online feature that Expedia Streets doesn't: address-to-address driving directions anywhere in the United States. Type in the origin and destination street addresses, and StreetFinder generates detailed driving directions, including distances. In my spot tests, it gave accurate directions around San Francisco.

Both companies also sell "deluxe" versions of their programs, but I'd skip the $70 Expedia Streets Deluxe and the $45 StreetFinder Deluxe. The added content (business listings, expanded travel information, and the like) can be found on the Web for free.

If you don't want to spend much, or if you want the more comprehensive driving directions, Rand McNally's StreetFinder 98 is a solid choice. Microsoft's Expedia Streets 98 has more-expansive online features and a nicer interface—for a higher price.

—*Glenn McDonald* ▶

Expedia Streets 98

PRO: Great interface, great online travel features.

CON: No address-to-address driving directions.

VALUE: Expensive, but so simple to use.

Microsoft Corp.

800/426-9400

www.microsoft.com

Street price: $50

READER SERVICE NO. 804

StreetFinder 98

PRO: Provides address-to-address driving directions.

CON: Interface isn't quite as nice as Expedia Streets'.

VALUE: Solid and affordable choice.

Rand McNally

800/761-5006

www.randmcnally.com

Street price: $25

READER SERVICE NO. 805

QUICK TAKES

Label Intensive

I'M THE CHIEF COOK and bottle washer for my home office. That means I get to do fun things like create the lunchroom menu. It also means I'm stuck with the job of printing labels for my PC user group newsletter. That's now easier, thanks to Avery LabelPro. This $39.99 program supports plenty of varieties of labels and includes many sample designs. For mailings, you can either use its database or import from existing ones. The best feature is "shrink to fit": The program automatically resizes text or graphics to fit the label. A trial version is available online. Avery Dennison; 800/862-2227; www.avery.com/prod_catalog/software.

READER SERVICE NO. 806

—*Steve Bass*

Organize Graphics Files

WHAT A PARADOX: I've got several thousand photos and clip art images on my hard drive, yet I can never find the right one for a newsletter or presentation. Extensis's Portfolio 3.0 gets me organized. It automatically creates browsable catalogs, with thumbnail previews, of images stored on hard disk, CD-ROM, or other media. Add keywords to the images, and you can do sophisticated searches. This $99.95 dual-platform package also lets Windows and Macintosh users share catalogs on a server. But beware of a few rough spots. When I enlarged the thumbnails, they displayed in a crude fashion. And a few of the several dozen supported file formats are out-of-date; for example, it's two versions behind on PowerPoint. Extensis; 503/274-2020; www.extensis.com.

READER SERVICE NO. 807

—*Harry McCracken*

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Marketing Diagrams
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Industry standard–640x480 pixels

New Kodak DC210–1152x864 pixels

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Presenting the easiest way to

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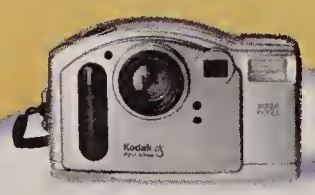
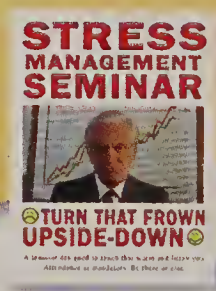


1. The New DC210 Zoom Camera
Use it right out of the box.
One-touch downloading too.

2. Picture Easy 2.0
software is included. There's no simpler way to manage images.



3. Print your document.
For sharper output, use any inkjet printer and KODAK inkjet paper.

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Everything looks better with the affordable DC210. This remarkable camera captures a million pixels per picture, which is enough detail to make a **5"x7"** image look like a traditional **5"x7"** photo. And with our *Kodak Digital Science* Picture Easy Software 2.0, cropping, rotating, and using pictures has never been simpler. All for about $900U.S. Find out more about our full line of digital products at 1-800-KODAK-22 or www.kodak.com/go/dc210b

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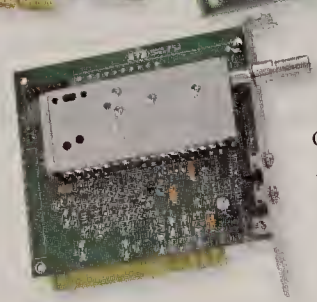
TAKE PICTURES. FURTHER.™

Matrox's Complete Video Upgrade for PCs

MULTIMEDIA

FOR ITS $379 **Video, Graphics, and TV Kit,** Matrox Graphics combines three products—its 4MB Mystique 220 graphics card, the Rainbow Runner Studio video capture daughterboard, and the Rainbow Runner TV tuner card—into one package. If you'd like to completely revamp the video capabilities of your PC, Matrox's kit provides a solid solution that's priced $50 less than the components would cost separately.



MATROX'S VIDEO, GRAPHICS, AND TV KIT: A multimedia makeover for your PC.

Based on my work with a shipping version, you'll need about an hour to install the kit. It requires an open PCI slot (for the graphics card) with enough clearance on one side to attach the Studio daughterboard. You'll also need an open ISA slot for the TV tuner card. And finally, you'll have to attach the cables both internally (between the TV tuner and graphics cards) and externally (to your sound card, audiovisual equipment, and TV antenna or cable service).

The Mystique 220 graphics card offers 1600 by 1200 resolution at 65,536 colors, and the Rainbow Runner Studio daughterboard provides hardware MPEG-1 playback. The supplied software is noteworthy: You can do video editing tasks with Ulead's MediaStudio, videoconference with VDOnet's VDOPhone, use PC-to-TV output for presentations or gaming, and of course watch broadcast or cable TV from your PC.

You can also "monitor" television broadcasts using keywords. You set the kit's PC-VCR software (from Matrox) to search a TV channel's closed-caption section for keywords. Upon finding the keywords, the software records the program to disk, opens a video window on your desktop, or saves the closed-caption text to a file.

If you plan a complete video upgrade of your PC, the Matrox kit is a good buy.

—Dean Andrews

Matrox Video, Graphics, and TV Kit

PRO: Plenty of graphics and video power.

CON: Installation takes some time.

VALUE: An affordable, complete video upgrade.

Matrox Graphics Inc.

800/361-1408

www.matrox.com

Street price: $379

READER SERVICE NO. 808

Matrox m3D Affordably Improves 3D Games

GRAPHICS

MATROX'S MYSTIQUE 220 and Millennium II graphics boards make quick work of 2D applications, but they don't have all the goodies that gaming fans want. In particular, they lack hardware filtering, a feature that smooths 3D images so they don't look blocky and pixelated. If you love your existing graphics board but crave better 3D performance, Matrox has a quick fix: the new **m3D** board, expected to sell for a reasonable $99.

The m3D will work not just with boards from Matrox, but with any PCI graphics card that has at least 2MB of RAM, the company says. Based on NEC's PowerVR PCX2 chip, the m3D comes with 4MB of SDRAM. Installation requires an open PCI slot.

Will this card pump better 3D images onto your screen? We tested a shipping m3D card with two PCs. One was equipped with the Mystique 220 card, the other with STB's Velocity 3D (an S3 Virge/VX–based card that produces only average 3D images). The results with both were the same: Two of our three test games, Eidos's Terracide and Fox Interactive's Independence Day, looked far better with the m3D card than without it. Game play and images were smooth; instead of the bunches of unattractive pixels we're used to, surfaces were blended and realistic looking.

But this card won't help with every game. Our third test game, Microsoft's Monster Truck Madness, was practically unplayable. It ran slowly, and the alpha-transparency feature (which places a texture map on top of a game scene) didn't work. When the trucks kicked up dust, the dust clouds were surrounded by ugly black background boxes that should not have shown. This is most likely a driver issue that Matrox could correct.

The bottom line: The m3D is a good, affordable solution. But if you want the best 3D quality and are willing to pay, consider the new $200-range graphics cards based on chips like nVidia's Riva 128. They offer good 2D and 3D capabilities on one board.

—JoAnne Robb ▶

m3D

PRO: Improves 3D ability of existing graphics boards.

CON: Doesn't equal the quality of some combo 2D/3D boards.

VALUE: Affordable route to better 3D game playing.

Matrox Graphics Inc.

800/361-1408

www.matrox.com/mga

Street price: $99

READER SERVICE NO. 809

We've contributed several advances to the notebook PC.

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intel inside
pentium®
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Greater availability because NEC is one of the world's largest manufacturers of TFT LCD displays.

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- The immediate availability of competitively priced products.
- The resources of one of the world's largest computer companies.

NEC NOW

MMX™ intel inside pentium® PROCESSOR

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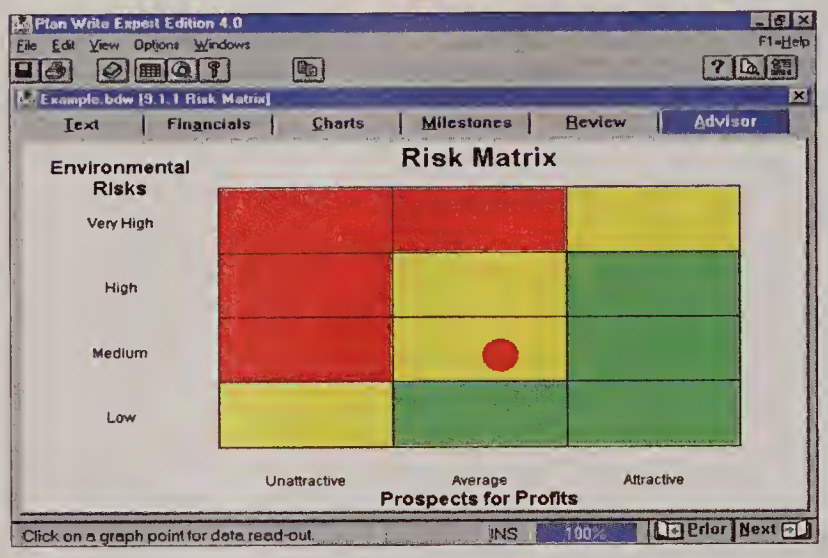

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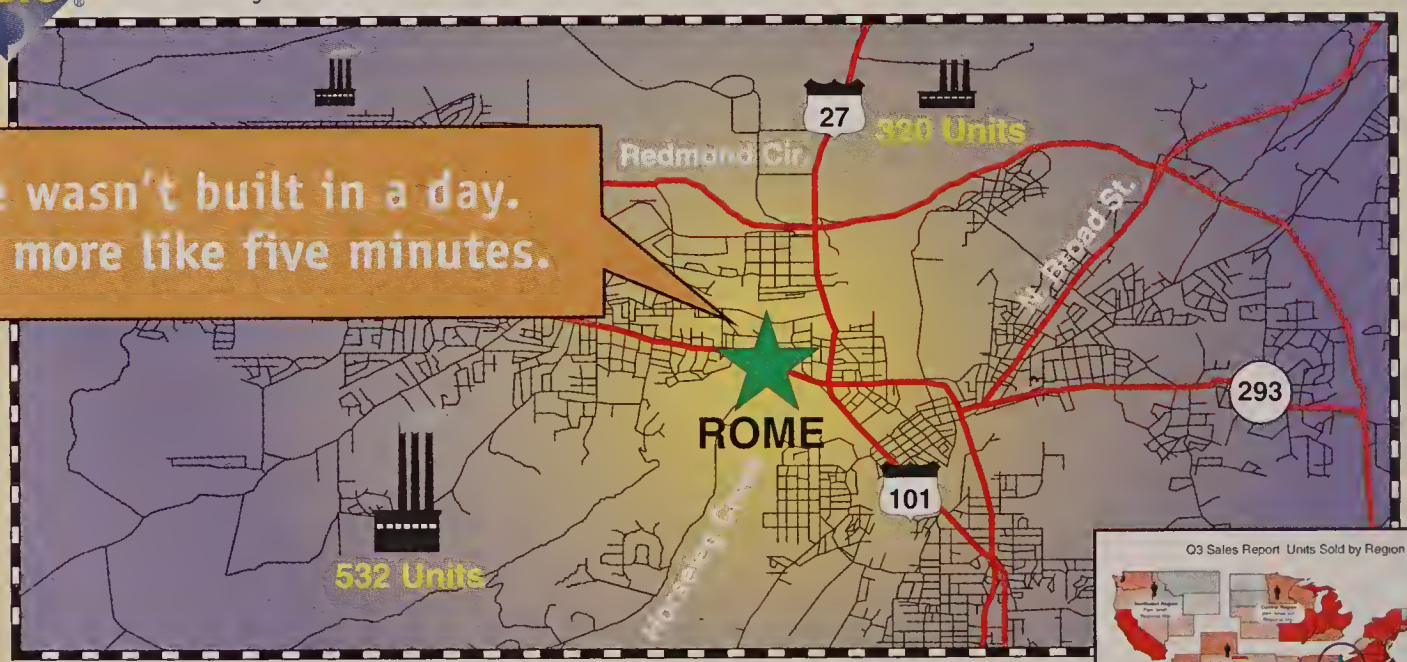

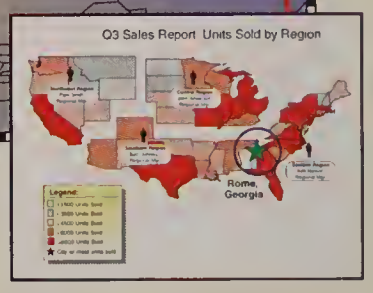

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Crystal 3D Impact: Easy Graphic Effects

GRAPHICS

YOU NO LONGER have to be Picasso, or a programmer, to create 3D art and animations for Web pages and presentations. Among a growing number of point-and-click–style programs, CrystalGraphics' **Crystal 3D Impact** is a well-rounded choice for only $49.

Between its toolbars and right-click menus, you'll find quick access to the tasks you use most often. To begin, you can import an existing image or choose from a series of objects at the bottom of the screen—simple shapes such as cones, cubes, and spheres, as well as familiar items like stars, mailboxes, and trophies.

Drag the objects to the workspace for editing and resizing. Right-click, and you can rotate the image or make it look like it's made of metal, wood, or another material. You can assign motion—say, spin the object from left to right, slide it across the screen, or arc it from one corner to another. You can turn the image into a movie, then save it as an .avi file, an animated GIF, or a series of bit maps (among other options).

However, after using the shipping version of 3D Impact, I have two criticisms. First, it's a memory hog. The software requires 16MB of RAM, but with 32MB on my system, I often lacked enough free memory to run 3D Impact and open a simple Word document at the same time. Also, the program lacks multiple undo, so you must save often (and under different file names) to retrieve that look you had three steps back.

By comparison, Micrografx's Simply 3D version 2 gives you some sophisticated effects and more objects than 3D Impact, but it costs $40 more. Ulead's Cool 3D, also reviewed in this month's *New Products*, costs about the same as 3D Impact but handles only text for logos—not graphics. You can download a free trial version of Crystal 3D Impact to try out.

—*Paul Heltzel*

For more information about a product, contact the manufacturer or circle the number on the reader service card. ■

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Satellite 220CDS	133MHz Pentium	16MB/144MB	1.34GB	10X	12.1" dual scan	-	Lithium ion battery	$1589.93	B9777
Satellite Pro 440CDX	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" dual scan	-	Lithium ion battery	$1989.69	90351
Satellite Pro 440CDT	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" active matrix	33.6K bps	Lithium ion battery	$2799.55	90352
Satellite Pro 460CDT	166MHz Pentium MMX	32MB/160MB	2.02GB	10X	12.1" active matrix	33.6K bps	Lithium ion battery	$3659.16	90353
Portege 300CT	133MHz Pentium MMX	32MB/64MB	1.5GB	-	10.4" active matrix	33.6K bps	external floppy	$3369.46	90354
Portege 660CDT	150MHz Pentium	16MB/B0MB	1.2GB	10X	11.3" active matrix	2B.BK bps	external floppy	$3099.63	77243
Tecra 510CDT	133MHz Pentium	16MB/144MB	2.1GB	10X	12.1" active matrix	2B.8K bps	16-bit stereo sound	$2489.49	77241
Tecra 520CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	SVGA resolution	$4159.45	90355
Tecra 530CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	XGA resolution	$4579.17	90359
Tecra 730XCDT	150MHz Pentium MMX	16MB/144MB	2GB	10X	12.1" active matrix	2B.8K bps	full duplex speakerphone	$3499.77	80957
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	2B.BK bps	video conferencing kit	$4849.62	B7964
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	2B.BK bps	Windows NT V4.0	$4999.31	B7965
Tecra 750CDT	233MHz Pentium MMX	32MB/160MB	4.7GB	20X	13.3" active matrix	56.6K bps	32-bit PCI bus	$6449.23	96534
IBM ThinkPad									
3B0D	150MHz Pentium MMX	16MB/B0MB	2.1GB	BX	12.1" active matrix	-	16-bit stereo sound	$2719.34	B6305
3B0E	150MHz Pentium MMX	16MB/B0MB	2.1GB	-	12.1" dual scan	-	SVGA resolution	$1939.22	94541
3B0ED	166MHz Pentium MMX	16MB/B0MB	2.1GB	20X	12.1" dual scan	-	SVGA resolution	$2429.85	94542
380ED	166MHz Pentium MMX	16MB/B0MB	3GB	20X	12.1" active matrix	-	16-bit stereo sound	$3329.44	94543
560	133MHz Pentium	BMB/40MB	2.1GB	-	12.1" active matrix	-	external floppy	$2429.85	B11B6
560E	150MHz Pentium MMX	16MB/B0MB	2.1GB	-	11.3" dual scan	-	16-bit stereo sound	$2149.25	B9290
560E	166MHz Pentium MMX	16MB/B0MB	2.1GB	-	12.1" active matrix	-	16-bit stereo sound	$3719.51	B9291
560X	233MHz Pentium MMX	32MB/96MB	4GB	-	12.1" active matrix	-	16-bit stereo sound	$4499.17	9B309
760XL	166MHz Pentium MMX	16MB/104MB	2.1GB	optional	12.1" active matrix	-	16-bit stereo sound	$3769.88	B4102
760XD	166MHz Pentium MMX	32MB/104MB	3GB	BX	12.1" active matrix	2B.8K bps	XGA resolution	$4599.98	84101
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765D	166MHz Pentium MMX	32MB/104MB	3GB	BX	13.3" active matrix	28.BK bps	Mwave DSP subsystem	$5499.91	89292
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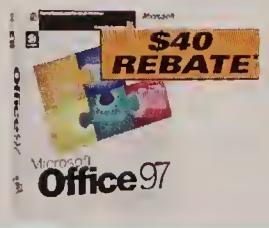
770	233MHz Pentium MMX	32MB/160MB	4GB	-	13.3" active matrix	-	Windows NT V4.0	$5899.36	94546
770	233MHz Pentium MMX	32MB/160MB	5.1GB	-	14.1" active matrix	33.6K bps	Lithium ion battery	$6779.05	94547
Compaq Armada									
1530DM	133MHz Pentium MMX	16MB/B0MB	1.4GB	10X	12.1" dual scan	33.6K bps	full duplex speakerphone	$1959.67	91507
1540DM	150MHz Pentium MMX	16MB/B0MB	2.1GB	20X	12.1" dual scan	33.6K bps	SVGA resolution	$2199.89	96613
1550DMT	133MHz Pentium	16MB/B0MB	1.4GB	10X	12.1" active matrix	33.6K bps	full duplex speakerphone	$2449.71	B7070
1580DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	full duplex speakerphone	$2739.76	90959
1590DMT	166MHz Pentium MMX	16MB/80MB	2.1GB	20X	12.1" active matrix	33.6K bps	SVGA resolution	$3159.62	96612
4130T	133MHz Pentium	16MB/4BMB	1.0BGB	-	11.B" active matrix	-	16-bit stereo sound	$1859.66	71116
4131T	133MHz Pentium	16MB/4BMB	1.4GB	-	12.1" active matrix	-	16-bit stereo sound	$1989.68	80775
4150	150MHz Pentium MMX	16MB/B0MB	1.6GB	-	12.1" dual scan	-	16-bit stereo sound	$2139.30	9150B
4160T	166MHz Pentium MMX	16MB/B0MB	2GB	-	12.1" active matrix	-	16-bit stereo sound	$3399.00	91509
4160T SL	166MHz Pentium MMX	16MB/B0MB	2GB	-	12.1" active matrix	-	16-bit stereo sound	$3599.00	96734
7330T	150MHz Pentium MMX	16MB/12BMB	2.1GB	-	12.1" active matrix	-	16-bit stereo sound	$3299.00	93735
7350MT	166MHz Pentium MMX	32MB/12BMB	2.1GB	-	12.1" active matrix	33.6K bps	16-bit stereo sound	$3799.00	93736
7710MT	150MHz Pentium MMX	16MB/144MB	1.6GB	optional	12.1" active matrix	33.6K bps	64-bit PCI bus	$2799.00	8B242
7730MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	64-bit PCI bus	$4399.00	8B241
7750MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	64-bit PCI bus	$4999.00	88240
7770DMT	233MHz Pentium MMX	32MB/144MB	3GB	20X	12.1" active matrix	33.6K bps	64-bit PCI bus	CALL!	96735



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Model	Processor	RAM std./max.	Hard drive	CD-ROM	Color display	Modem	Features	Price	CDW
Compaq Presario									
1210	150MHz Pentium	16MB/80MB	1.4GB	14X	12.1" dual scan	33.6K bps	16-bit stereo sound	$1999.00	90514
1610	150MHz Pentium MMX	16MB/80MB	1.6GB	14X	12.1" dual scan	56K bps	16-bit stereo sound	$2399.00	90515
1620	166MHz Pentium MMX	16MB/80MB	2.1GB	20X	12.1" dual scan	56K bps	16-bit stereo sound	$2599.00	95098
1585DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	12X	12.1" active matrix	33.6K bps	16-bit stereo sound	$2799.00	92232
AST Ascentia									
M5130S	133MHz Pentium MMX	32MB/128MB	1.6GB	20X	12.1" dual scan	-	Lithium ion battery	$2399.86	95321
M5160T	166MHz Pentium MMX	32MB/128MB	1.6GB	20X	12.1" active matrix	-	SVGA resolution	$2946.24	96484
M5200T	200MHz Pentium MMX	32MB/128MB	2.1GB	20X	12.1" active matrix	56K bps	SVGA resolution	$3489.25	96485
M5160X	166MHz Pentium MMX	32MB/128MB	2.1GB	20X	13.3" active matrix	56K bps	XGA resolution	$3889.25	96507
M5230T	233MHz Pentium MMX	32MB/128MB	3.3GB	20X	12.1" active matrix	56K bps	SVGA resolution	$4299.56	96488
M5230X	233MHz Pentium MMX	64MB/128MB	4GB	20X	13.3" active matrix	56K bps	XGA resolution	$5299.39	96486
Acer Texas Instruments									
Extensa 610CD	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" dual scan	-	external floppy	$1964.67	88530
Extensa 610CDT	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" active matrix	-	external floppy	$2549.84	88531
Extensa 670CD	166MHz Pentium MMX	16MB/80MB	1.6GB	10X	12.1" dual scan	-	16-bit stereo sound	$2699.29	95273
Extensa 670CDT	166MHz Pentium MMX	32MB/80MB	2.1GB	10X	12.1" active matrix	-	SVGA resolution	$3398.45	95275
TravelMate 7060	166MHz Pentium MMX	32MB/64MB	2GB	10X	12.1" active matrix	33.6K bps	16-bit stereo sound	$4289.59	88471
TravelMate 7063NT	166MHz Pentium MMX	32MB/64MB	3GB	10X	12.1" active matrix	33.6K bps	Windows NT V4.0	$4949.69	88472
Fujitsu LifeBook									
555Tx	150MHz Pentium MMX	16MB/80MB	2GB	10X	12.1" active matrix	33.6K bps	16-bit stereo sound	$3199.00	85008
565Tx	166MHz Pentium MMX	32MB/96MB	2GB	20X	12.1" active matrix	33.6K bps	XGA resolution	$4299.00	92055
635Tx	133MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	16-bit stereo sound	$3199.00	92058
655Tx	150MHz Pentium MMX	16MB/80MB	1.3GB	8X	12.1" active matrix	33.6K bps	external floppy	$3799.00	85013
656Tx	150MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	SVGA resolution	$4299.00	92061
Hitachi VisionBook									
4150x	150MHz Pentium MMX	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	16-bit stereo sound	$2299.00	91047
4360x	166MHz Pentium MMX	16MB/128MB	2.1GB	10X	12.1" active matrix	33.6K bps	SVGA resolution	$2999.00	91049
7340	133MHz Pentium MMX	16MB/144MB	1.4GB	10X	12.1" active matrix	56K bps	16-bit stereo sound	$2999.00	91051
7360	166MHz Pentium MMX	32MB/144MB	2.1GB	10X	12.1" active matrix	56K bps	16-bit stereo sound	$4299.00	91053
7560	166MHz Pentium MMX	32MB/144MB	3GB	10X	13.3" active matrix	56K bps	XGA resolution	$4799.00	91054
8560	166MHz Pentium MMX	16MB/80MB	2.1GB	10X	13.3" active matrix	56K bps	XGA resolution	$4599.00	91056
Hewlett-Packard OmniBook Notebook PCs									
800CT	166MHz Pentium MMX	16MB/80MB	2GB	-	10.4" active matrix	-	external floppy	$3719.16	85727
2000CS	133MHz Pentium	16MB/128MB	1.4GB	-	12.1" dual scan	-	SVGA resolution	$2049.50	88749
2000CT	133MHz Pentium	16MB/128MB	1.4GB	-	12.1" active matrix	-	32-bit PCI bus	$2344.23	88750
2000CT	133MHz Pentium MMX	16MB/128MB	2GB	-	12.1" active matrix	-	32-bit PCI bus	$2699.97	88751
5700CT	150MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	-	16-bit stereo sound	$2999.15	85720
5700CT	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	-	16-bit stereo sound	$3369.02	85721
5700CTX	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	-	XGA resolution	$3459.82	85723
5700CTX	166MHz Pentium MMX	32MB/128MB	2.79GB	optional	12.1" active matrix	-	XGA resolution	$4039.53	85722

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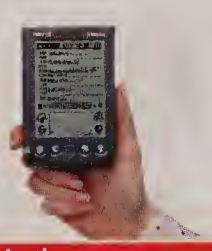

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Desktops

Model	Processor	Chassis	RAM std./max.	Hard drive	CD-ROM	Video	Modem	Price	CDW
Compaq Deskpro 2000									
5166X/2100	166MHz Pentium MMX	desktop	16MB/3B4MB	2.1GB	optional	S3 Trio64V2/GX	-	$1059.00	92269
5166X/3200	166MHz Pentium MMX	desktop	16MB/3B4MB	3.2GB	optional	S3 Trio64V2/GX	-	$1109.00	92B3B
5166X/3200	166MHz Pentium MMX	mini-tower	16MB/3B4MB	3.2GB	16X Max	S3 Trio64V2/GX	-	$1429.00	92B39
5200X/2100	200MHz Pentium MMX	desktop	16MB/3B4MB	2.1GB	optional	S3 Trio64V2/GX	-	$1179.00	92B40
5200X/3200/CDS	200MHz Pentium MMX	mini-tower	32M8/3B4MB	3.2GB	16X Max	S3 Trio64V2/GX	-	$1549.00	92B42
5200X/3200	200MHz Pentium MMX	desktop	32MB/3B4MB	3.2GB	optional	S3 Trio64V2/GX	-	$1339.00	92B41
5233X/3200/CDS	233MHz Pentium MMX	desktop	32MB/3B4MB	3.2GB	16X Max	S3 Trio64V2/GX	-	$1719.00	92B43
6233X/2100	233MHz Pentium II	desktop	32MB/3B4MB	2.1GB	optional	Matrox 1064-SG	-	$1749.00	95916
6233X/3200/CDS	233MHz Pentium II	desktop	32MB/3B4MB	3.2GB	24X Max	Matrox 1064-SG	-	$1989.00	95917
6266X/3200/CDS	266MHz Pentium II	desktop	32MB/3B4MB	3.2GB	24X Max	Matrox 1064-SG	-	$2209.00	9591B
6266X/3200/CDS	266MHz Pentium II	mini-tower	32MB/3B4MB	3.2GB	24X Max	Matrox 1064-SG	-	$2239.00	95919
6300X/3200/CDS	300MHz Pentium II	mini-tower	32MB/3B4MB	3.2GB	24X Max	Matrox 1064-SG	-	$2579.00	95920
Compaq Deskpro 4000									
5166X/2400	166MHz Pentium MMX	desktop	16MB/256MB	2.4GB	optional	S3 ViRGE/GX	-	$1279.00	92B44
5166X/3200	166MHz Pentium MMX	desktop	32M8/256MB	3.2GB	optional	S3 ViRGE/GX	-	$1449.00	92B45
5166X/3200/CDS	166MHz Pentium MMX	mini-tower	32MB/256MB	3.2GB	16X Max	S3 ViRGE/GX	-	$1649.00	92B46
5200X/2400	200MHz Pentium MMX	desktop	32MB/256MB	2.4GB	optional	S3 ViRGE/GX	-	$1509.00	92847
5200X/3200	200MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 ViRGE/GX	-	$1559.00	92B4B
5233X/3200X/CDS	233MHz Pentium MMX	mini-tower	32MB/256MB	3.2GB	16X Max	S3 ViRGE/GX	-	$1919.00	92B49
6233X/2400XCDS	233MHz Pentium II	mini-tower	32MB/256MB	2.4GB	optional	Matrox 1064-SG	-	$1849.00	95921
6233X/3200XCDS	233MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	$2109.00	95922
6266X/3200X/CDS	266MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	$2329.00	95924
6233X/3200X/CDS	233MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	$2139.00	95923
6266X/3200X/CDS	266MHz Pentium II	mini-tower	32MB/256MB	3.2GB	24X Max	Matrox 1064-SG	-	$2359.00	95925
Compaq Deskpro 6000									
6233X/2100/CDS	233MHz Pentium II	desktop	32MB	2.1GB	24X Max	Matrox Millennium II	-	$2399.00	95929
6266X/2100/CDS	266MHz Pentium II	desktop	32MB	2.1GB	24X Max	Matrox Millennium II	-	$2629.00	95930
6266X/4300/CDS	266MHz Pentium II	desktop	32MB	4.3GB	24X Max	Matrox Millennium II	-	$2929.00	95931
6300X/4300/CDS	300MHz Pentium II	desktop	64MB	4.3GB	24X Max	Matrox Millennium II	-	$3529.00	95933
6266X/4300/CDS	266MHz Pentium II	mini-tower	64MB	4.3GB	24X Max	Matrox Millennium II	-	$3219.00	95932
6300X/4300/CDS	300MHz Pentium II	mini-tower	64MB	4.3GB	24X Max	Matrox Millennium II	-	$3559.00	95934
Compaq Presario									
2200	1B0MHz processor with MediaGX	desktop	16MB/64MB	1.6GB	BX	MPEG full-motion playback	33.6K bps	$799.00	92B52
4505	166MHz Pentium MMX	mini-tower	16MB/64MB	2.1GB	16X Max	64-bit PCI accelerated	33.6K bps	$999.00	95066
450B	200MHz Pentium MMX	mini-tower	24MB/64MB	3.2GB	16X Max	64-bit PCI accelerated	33.6K bps	$1199.00	90510
452B	233MHz Pentium MMX	mini-tower	32MB/64MB	3.2GB	24X Max	64-bit PCI accelerated	33.6K bps	$1499.00	90511
4B40	266MHz Pentium II	mini-tower	32MB/64MB	6.5GB	2X DVD	4MB ATI Rage Pro 3D	56K bps	$2699.00	95064
4B50	300MHz Pentium II	mini-tower	4BMB/64MB	6.5GB	2X DVD	4MB ATI Rage Pro 3D	56K bps	$2999.00	95065
IBM PC Series									
PC 300GL	166MHz Pentium MMX	desktop	32MB/12BMB	2.5GB	optional	Cirrus Logic 5446	-	$1289.32	94B5B
PC 300GL	166MHz Pentium MMX	desktop	16MB/12BMB	2.5GB	optional	Cirrus Logic 5446	-	$1208.01	B929B
PC 300GL	200MHz Pentium MMX	desktop	32MB/128MB	2.5GB	16X Max	Cirrus Logic 5446	-	$1579.18	89296
PC 300GL	200MHz Pentium MMX	desktop	32MB/128MB	2.5GB	optional	Cirrus Logic 5446	-	$1449.74	95162
PC 300PL	200MHz Pentium MMX	desktop	32MB/3B4MB	2.5GB	optional	Matrox Mystique	-	$1575.34	94012
PC 300PL	200MHz Pentium MMX	desktop	32MB/3B4MB	4.2GB	24X Max	Matrox Mystique	-	$1839.20	94014
PC 300PL	233MHz Pentium MMX	desktop	32MB/3B4MB	4.2GB	24X Max	Matrox Mystique	-	$2045.54	95759
PC 300PL	166MHz Pentium MMX	mini-tower	32MB/384MB	2.5GB	optional	Matrox Mystique	-	$1469.23	95762
PC 300PL	200MHz Pentium MMX	mini-tower	32MB/3B4MB	4.2GB	optional	Matrox Mystique	-	$1689.77	94013
PC 300PL	233MHz Pentium MMX	mini-tower	32MB/3B4MB	4.3GB	24X Max	Matrox Mystique	-	$2449.56	95764
PC 300XL	233MHz Pentium II	desktop	32MB/3B4MB	2.5GB	16X Max	S3 Trio64V2	-	$2259.14	86313
PC 300XL	233MHz Pentium II	desktop	32MB/3B4MB	2.5GB	optional	S3 Trio64V2	-	$1975.36	86314
PC 300XL	266MHz Pentium II	desktop	32MB/3B4MB	4.2GB	16X Max	S3 Trio64V2	-	$2659.12	86315
PC 300XL	266MHz Pentium II	desktop	32MB/3B4MB	4.3GB	16X Max	S3 Trio64V2	-	$2925.24	B6316

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Model	Processor	Chassis	RAM std./max.	Hard drive	CD-ROM	Video	Modem	Price	CDW
IBM Aptiva									
S35	233MHz Pentium MMX	mini-tower	4BMB/64MB	6.4GB	24X Max	ATI 3D RAGE II	33.6K bps	$2499.27	9053B
HP Brio Series									
8012	166MHz Pentium MMX	mini-tower	16MB/128MB	2.1GB	optional	S3 Trio 64V2	-	$999.53	95050
8014	200MHz Pentium MMX	mini-tower	16MB/128MB	2.1GB	optional	S3 Trio 64V2	-	$1154.35	95052
8017	233MHz Pentium MMX	mini-tower	32MB/128MB	3.2GB	optional	S3 Trio 64V2	-	$1449.95	95053
8032	166MHz Pentium MMX	mini-tower	16MB/128MB	2.1GB	16X Max	S3 Trio 64V2	-	$1149.54	95054
8034	200MHz Pentium MMX	mini-tower	32MB/128MB	2.1GB	16X Max	S3 Trio 64V2	-	$1419.35	95055
8037	233MHz Pentium MMX	mini-tower	32MB/128MB	3.2GB	24X Max	S3 Trio 64V2	-	$1649.54	95056
8172	166MHz Pentium MMX	mini-tower	16MB/128MB	2.1GB	16X Max	S3 Trio 64V2	56K bps	$1379.29	95057
8174	200MHz Pentium MMX	mini-tower	32MB/192MB	2.1GB	24X Max	S3 Trio 64V2	56K bps	$1635.54	95058
8175	200MHz Pentium MMX	mini-tower	32MB/192MB	2.1GB	24X Max	S3 Trio 64V2	56K bps	$1749.63	95059
8177	233MHz Pentium MMX	mini-tower	32MB/192MB	4GB	24X Max	S3 Trio 64V2	56K bps	$1869.90	95060
817B	233MHz Pentium MMX	mini-tower	32MB/192MB	6GB	24X Max	Matrox Millennium	56K bps	$2117.37	95061
HP Vectra VE Series 3 PC									
VE3 5/200	200MHz Pentium	desktop	16MB/192MB	1GB	optional	SiS 6205	-	$998.20	963B2
VE3 5/166M	166MHz Pentium MMX	desktop	16MB/192MB	1.6GB	optional	SiS 6205	-	$1099.85	96383
VE3 5/200M	200MHz Pentium MMX	desktop	16MB/192MB	1.6GB	optional	SiS 6205	-	$1199.32	96384
VE3 5/166M	166MHz Pentium MMX	desktop	16MB/192MB	1.6GB	24X	SiS 6205	-	$1259.73	96389
HP Vectra VL Series 5 PC									
VL5 5/166M	166MHz Pentium MMX	desktop	16MB/192MB	1.6GB	-	2MB S3 Trio64 V2	-	$1299.96	95735
VL5 5/166M	166MHz Pentium MMX	desktop	16MB/192MB	2.5GB	24X	2MB S3 Trio64 V2	-	$1444.89	95730
VL5 5/166M	166MHz Pentium MMX	desktop	32MB/192MB	2.5GB	-	2MB S3 Trio64 V2	-	$1459.70	95736
VL5 5/200M	200MHz Pentium MMX	desktop	16MB/192MB	2.5GB	-	2MB S3 Trio64 V2	-	$1449.95	95737
VL5 5/200M	200MHz Pentium MMX	desktop	32MB/192MB	2.5GB	24X	2MB S3 Trio64 V2	-	$1678.26	95732
VL5 5/166M	166MHz Pentium MMX	mini-tower	16MB/192MB	2.5GB	24X	2MB S3 Trio64 V2	-	$1499.15	95731
VL5 5/200	200MHz Pentium	mini-tower	16MB/192MB	2.5GB	24X	2MB S3 Trio64 V2	-	$1459.01	95407
VL5 5/200M	200MHz Pentium MMX	mini-tower	32MB/192MB	2.5GB	-	2MB S3 Trio64 V2	-	$1626.05	95738
VL5 5/200M	200MHz Pentium MMX	mini-tower	32MB/192MB	2.5GB	24X	2MB S3 Trio64 V2	-	$1739.59	95733
VL5 5/233M	233MHz Pentium MMX	mini-tower	32MB/192MB	4GB	24X	2MB S3 Trio64 V2	-	$1967.75	95734
AST Bravo									
MS 5166M	166MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1469.33	97096
MS 5200/M	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1576.37	91570
MS 5233/M	233MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1799.48	95813
MS 5200/M	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	-	$1576.37	91570
MS 6266/M	266MHz Pentium II	desktop	32MB/256MB	4.3GB	24X Max	ATI 3D RAGE II	-	$2569.64	95823
MS 6266/M	266MHz Pentium II	desktop	32MB/256MB	4.3GB	24X Max	ATI 3D RAGE II	-	$2649.51	95822
MS 6300/M	300MHz Pentium II	mini-tower	32MB/384MB	4.3GB	24X Max	ATI 3D RAGE II	-	$2759.76	95825
MS 6300/M	300MHz Pentium II	mini-tower	32MB/384MB	4.3GB	24X Max	ATI 3D RAGE II	-	$2859.99	95826
LC 5166/M	166MHz Pentium MMX	desktop	16MB/256MB	2GB	optional	S3 ViRGE	-	$986.11	9328B
LC 5200/M	200MHz Pentium MMX	desktop	32MB/256MB	2GB	optional	S3 ViRGE	-	$1166.53	95811
LC 6233/M	233MHz Pentium II	mini-tower	32MB/256MB	2GB	16X Max	S3 ViRGE	-	$1859.63	89107
LC 6233/M	233MHz Pentium II	mini-tower	32MB/256MB	2GB	16X Max	S3 ViRGE	-	$1759.44	89108
Acer									
Network Ready	200MHz Pentium	desktop	32MB/128MB	2.1GB	optional	64-bit PCI accelerated	-	$996.32	91867
Network Ready	166MHz Pentium MMX	desktop	16MB/128MB	1GB	optional	64-bit PCI accelerated	-	$938.11	96176
Network Ready	200MHz Pentium MMX	desktop	32MB/128MB	2.1GB	optional	64-bit PCI accelerated	-	$1265.65	96178
Business MM	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	20X	64-bit PCI accelerated	-	$1134.18	91883
Business MM	166MHz Pentium MMX	desktop	32MB/384MB	3.2GB	20X	64-bit PCI accelerated	-	$1219.89	91B84
Business MM	200MHz Pentium MMX	mini-tower	32MB/384MB	3.2GB	20X	64-bit PCI accelerated	-	$1589.98	91BB5
Acer Power	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	8X	64-bit PCI accelerated	-	$1077.36	91872
Toshiba									
Equium 5200D	200MHz Pentium MMX	desktop	32MB/192MB	2.38GB	12X	2MB ATI 3D RAGE II	-	$1549.64	84249
Equium 5230D	233MHz Pentium MMX	desktop	32MB/192MB	3GB	24X Max	2MB ATI 3D RAGE II+	-	$1798.36	95209
Equium 6230D	233MHz Pentium II	desktop	32MB/192MB	3GB	24X Max	2MB ATI 3D RAGE II+	-	$2199.43	95208
Equium 6260M	266MHz Pentium II	mini-tower	32MB/256MB	3.73GB	16X	4MB ATI 3D RAGE II+	-	$2569.07	93106
Infinia 7230	233MHz Pentium MMX	mini-tower	64MB/128MB	6.4GB	24X	2MB ATI RAGE II	56K bps	$2029.25	96270
Infinia 7231	233MHz Pentium MMX	mini-tower	64MB/128MB	4GB	DVD	2MB ATI RAGE II	56K bps	$2495.50	96269
Infinia 7260	266MHz Pentium II	mini-tower	64MB/128MB	6.4GB	24X	2MB ATI RAGE II	56K bps	$2599.47	96582

PC MAGAZINE EDITORS' CHOICE 6/10/97

Epson

Stylus Photo

Color ink jet printer

- 6-color technology and true 720 dpi resolution
- Smooth gradations and virtually continuous tone
- Includes award-winning Live Picture® for Macintosh® and LivePix™ for Windows® 95
- 2-year limited warranty

$499.00 CDW 88453

MAG Innovision

DJ700

17" color monitor

- 17" flat square technology CRT, 16.1" viewable image size
- 0.26mm dot pitch
- Maximum resolution: 1280 x 1024 at 65Hz
- 3-year limited warranty

$545.67 CDW 79018

3COM

Fast EtherLink XL

10/100 PCI Network interface card

- Dynamic Access features–including PACE Interactive technology, PACE real-time applications support, free PictureTel™ data conferencing software
- RJ-45 connection
- Lifetime warranty

$88.46 CDW 71029

NEW!

Lexmark

Color Jetprinter 7000

- Resolution: up to 1200 x 1200 dpi in color and black
- Print speed: up to 8 ppm black draft; up to 3 ppm color draft
- Lexmark Workshop™ CD-ROM
- 1-year warranty, next business day exchange

$339.74 CDW 87824

NEW!

UMAX

Astra 610S

- Resolution: 300 x 600 dpi optical, 4800 dpi interpolated
- Scan speed: 3ms/line grayscale, 9ms/line color
- Maximum scan area: 8.5" x 11"
- Scanning modes: 30-bit color, 10-bit grayscale

$168.64 CDW 98634

NEW!

Logitech

MouseMan+

- Unique wheel button
- Convenient thumb button for one-handed zooming
- Customizable fourth mouse button
- 3-year warranty

$55.23 CDW 94731

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Circle 65 on reader service card

Timex Ironman Triathlon Watch

When it comes to spiffing up your computer,
These 30 digital doodads are perfect for

Panasonic CoolShot KXL-600A

gadgets, gizmos,

Nokia 9000 Communicator

Canon BJC-80

nothing succeeds like accessories. home, business, or the road.

Inter@ctive Pager

gad•get ('ga-jet) *n. a mechanical contrivance or device; any ingenious article. gad•get•y ('ga-jet-y) adj.; synonyms: contraption; whatsis, doohickey, thingamajig.*

and gear

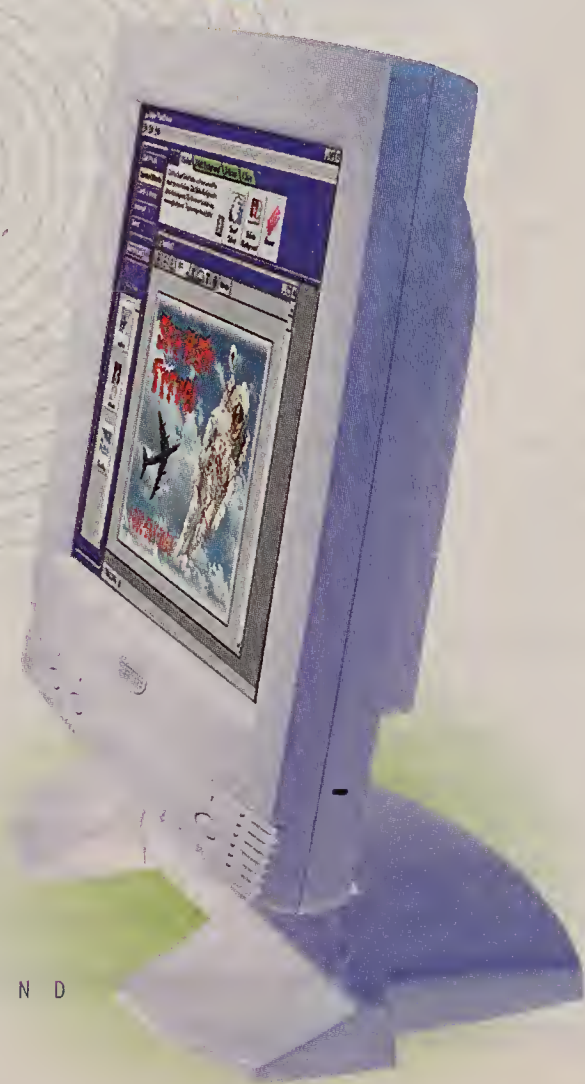
EDITED BY MICHAEL S. LASKY

HARDWARE BUYS

Everybody loves gadgets. True, many are "contrivances" that aren't worth their weight in plastic. But you won't find any of the 30 devices and PC accessories we've gathered here hawked on those oily late-night infomercials. These cool tools have been designed to make your life much easier—whether you're in the office, on the road, or at home. Their prices run the gamut from as little as $10 to a hefty $3000. (All prices given here are street prices.)

Now is a better time than ever to satisfy your gadget lust. One reason: recent strides in miniaturization, particularly with PC Cards. For example, the Lilliputian REX, a business card–size personal digital assistant, handles a whopping 2500 entries. Reason number two? The explosion in wireless communication services. To sate your cordless wanderlust, check out Nokia's 9000 Communicator, which cleverly packs a full-featured pocket PC into a digital cell phone.

Ultimately, these are gifts that would be perfect if they came in pairs: one to give away and one for yourself. ▶



Sceptre FT15 LCD Monitor

PHOTOGRAPHS BY KEVIN CANDLAND

in the office

Imation SuperDisk Drive

Hard Disk-Size Floppies

Imation SuperDisk Drive

The size of an average file is growing faster than Tiger Woods' bank account. If you're finding it harder to fit your files on reliable old floppy disks, it's time to call on SuperDisk. Imation's convenient SuperDisk Drive easily plugs into your PC's parallel port and reads and writes to 120MB LS-120 disks—which hold about 20MB more data than a Zip disk—as well as to regular 1.44MB floppies. The $199 SuperDisk Drive comes with one disk and costs about $50 more than an external Zip drive. Extra 120MB disks cost about $19 apiece. Maybe Tiger needs the SuperDisk Drive. After all, he's gotta have a way to store those big endorsement contracts. —*Laurianne McLaughlin*

Imation, $199, 888/466-3456, www.imation.com

READER SERVICE NO. 689

This Pen Clicks

iPen

A.T. Cross is probably best known for its now-classic thin gold ballpoint pen—you know, the one your parents got you for graduation. Now the company enters the digital age with its mouse killer, the iPen, an electronic pen-and-tablet combination. Just tap a spot on the pearl-gray writing surface of the tablet with the elegant black lacquer pen, and the cursor moves to a corresponding spot on screen. The pen tip retracts as you click, reducing the amount of pressure needed to maneuver. But this mouse replacement does more than any mouse ever did: The iPen lets you take notes in your own handwriting or add your John Hancock to faxes and other electronic documents. —*JoAnne Robb*

A.T. Cross, $149, 401/333-1200, www.cross-pcg.com

READER SERVICE NO. 690

Flat Screen, Fat Color

Sceptre FT15 LCD Monitor

Finally, I have extra room on my desk; I can retrieve those pens that slip behind my monitor without becoming a contortionist; and I can view programs in bright, crisp colors without risking sunburn. That's because Sceptre's new flat-screen 15-inch LCD monitor is compact and lightweight and emits zero magnetic radiation (it also consumes little power). The screen real estate is almost identical to that of most traditional 17-inch monitors, without the corresponding bulk. The only drawback is the prodigious price. At nearly $3000, the Sceptre costs about five times as much as an ordinary CRT monitor. This one has pure technolust splurge written all over it. So pull out the gold card and be dazzled. —*Brad Grimes*

Sceptre Technologies, $2999, 888/523-3815, www.sceptretech.com

READER SERVICE NO. 691

Back in Good Form

Executive BackChair

Executive chairs are designed to impress. They are really seats of power. And virtually everyone who steps into my humble office at *PC World* exclaims "Wow" when

Executive BackChair

ILLUSTRATION: GLENN MITSUI

Panasonic PC/Fax Store

A.T. Cross iPen

they see me in this richly upholstered, streamlined leather chair. I personally don't care if my chair impresses people: I want it to be comfortable, and yes, to save my back. And the Executive BackChair certainly does that every which way but loose: Its forward tilt feature is great when I'm pounding the computer keys, and the adjustable lumbar support and anatomically contoured seat relieve strategic pressure points all the time. Well, maybe impressing people is good, too.
—*Michael S. Lasky*

BackSaver Products Inc., $845 to $1295 depending on fabric, 800/251-2225, www.backsaver.com

READER SERVICE NO. 692

Call Control

Yo-Yo

The phone rings. Is it an important client, or some jerk selling tombstones? Big Island's Yo-Yo cuts out the guesswork, using the phone company's Caller ID and call forwarding services so you can tell who's on the line. Just plug the phone cord into the device (which actually looks like the toy it's named for), then connect the Yo-Yo to your Windows 95 PC via a serial port. A small program lets you block calls from unidentified callers, set do-not-disturb hours, and assign sounds to specific people, so that a call from your boss announces itself with a bullwhip crack. If you're out, Yo-Yo can page or e-mail you about a call or forward the call to another number. Select features continue to work when the PC is off. —*Lincoln Spector*

Big Island Communications, $99, 800/788-7751, www.big-island.com

READER SERVICE NO. 693

Put Faxes on Hold

PC/Fax Store

Once you give out your fax number, get ready to receive faxes 24 hours a day, seven days a week. Taking faxes through your modem means keeping your computer on and your fax software loaded—unless you buy Panasonic's PC/Fax Store. This simple gizmo sits between your modem and your phone line, accepting and saving any faxes that come your way—up to 40 or 80 pages, depending on the model. When it's convenient, you ▶

Yo-Yo

LEFT TO MY DEVICES

Don't Be a Cool-Tool Fool

Many gadgets are like congressional tax plans; they look great when they're announced but benefit only a select few. As a gadget maven who has reviewed mountains of devices, I've experienced the many unexpected technological—as well as predictable—pitfalls. Accordingly, here are some rules to heed when shopping for a gadget.

Try before you buy. Small keyboard-based devices are just that: small. See if you can type on them with any efficiency; most likely the process will be hunt and peck, but see if you can do that without lots of typos. If there's a stylus, try it out first to see if you'll *click* with it. Do a once-over inspection of any device and its documentation. I once returned a removable storage unit because I thought it was D.O.A.; it wasn't—I just hadn't noticed the recessed on/off switch camouflaged on the side.

You gotta have the ports. Check first to see that the necessary PC serial or parallel ports—or PC Card slots—are available on your system. It's crushing to get excited about a new gadget only to discover there's no space for it on the PC.

Look at future expenses. It's like buying a new car. You wrangle a great deal and then learn that the expenses of upkeep negate any savings. So check on the maintenance expenses beforehand: consumables such as batteries; cost of "optional" but ultimately necessary add-ons like an AC adapter or service and subscription fees; and any other secondary costs.

Have power, will travel. If you can get an AC adapter for the device, do so. Don't always rely on battery power or the promises of long battery life.

Don't get seduced and abandoned. It's easy to be seduced by a cool design, then discover the gadget doesn't really deliver. Buy from a retailer or mail-order firm with a no-questions return policy. Also, be clear about warranties and service and support. Check for service phone numbers on the box or in product info before you buy. —M. S. L.

boot your computer, load your fax software, press a button on the PC/Fax, and view your faxes. Best of all, there's no special software involved—the PC/Fax Store works with any fax program. —*L. S.*

Panasonic, KX-FB40 $149, KX-FB80 $199, www.panasonic.com/alive

READER SERVICE NO. 694

Avoid Computus Interruptus

Pulsar Desktop 220 UPS

Don't you just hate it when you're pushing to get a document completed and suddenly, *zap*, everything comes to a grinding halt? No lights, no power, no computer. And no way to recover your corrupted files or unsaved work. Now, there *is* a way with the Pulsar Desktop 220 Universal Power Supply. The Pulsar's nickel cadmium batteries effectively grant you 10 minutes of operation *after* the power fails, to properly shut down the PC. And if you're not at your computer, Pulsar software will close down for you automatically. While this UPS might look like a pregnant videocassette, its compact size (it can fit on a desktop) and affordable $129 price set it apart from most other UPS units with similar features. —*Kirk Steers*

MGE UPS Systems, $129, 800/523-0142, www.mgeups.com

READER SERVICE NO. 695

CD Cleaning for Dummies

Kensington CD Drive Cleaner

The laser lens that reads CD-ROMs is precise—and finicky. The most minute dust particle on a disc or on the lens can make Doom go boom in a flash. For less than $10, the Kensington CD Drive Cleaner keeps your lens dust-free. It looks like a normal CD with a tiny lens-cleaning brush stuck in the middle of the play side. Put the CD in your drive, and an audio track plays the instructions. In less than 10 seconds, cleaning is complete. A test track follows with 2 minutes of elevator music. Still got problems? You can call the toll-free Kensington cleaning hot line for help. —*M. S. L.*

Kensington Technology Group, $9.99, 800/535-4242, www.kensington.com

READER SERVICE NO. 696

ARE THEY FOR REAL?

Krazy Gadgets

Yes, these gadgets are for real. But after trying them out, we thought they'd be better as candidates for late-nite infomercials that might go like this:

Wizard Radio

Here's a hot new way to use up your PC's valuable serial port. Throw away the modem, mouse, or printer that's occupying it now and install ConTek's $39.99 Wizard FM Radio. The included software puts a virtual radio dial on your screen along with a Windows Sound Recorder, so you can make .wav files of whatever broadcast you manage to tune in. So get rid of that radio that's cluttering up your desk—you know, the one that gets *good* reception—and clutter up your PC instead. ConTek Int'l, 203/847-7755, www.canatronic.com/Wizard.htm

READER SERVICE NO. 719

No Hands Mouse

Say good-bye to that pesky desk mouse. With the No Hands Mouse from Hunter Digital, you can finally put your foot

The Sounds of Silence

NoiseBuster Extreme

"Would everybody please shut up!" Next time, don't blow your stack at the staffers milling outside your cubicle, just slip on the Noisebuster Extreme headset. This headphone-microphone combo features a matchbook-size audio enhancer (powered by two AAA batteries) that uses noise cancellation technology to obliterate external sounds. So no matter where you are—in the office, on a plane, or in a crowded con-

ILLUSTRATION: GLENN MITSUI

for Late Nite TV

down. Two floor pedals do all the work your mouse used to-one pedal to navigate and one to click. Now operating a computer will be as easy as driving a car. And when your computer crashes, you don't need a license or insurance. It's just $249.95. Drive one away today! Hunter Digital, 800/576-6873, www.footmouse.com

READER SERVICE NO. 722

TravRoute Door-to-Door CoPilot

Never get lost on your own again, let the amazing Door-to-Door CoPilot from TravRoute help you. This incredible homing device attaches to your notebook PC and your car's cigarette lighter. Using Global Positioning Satellites and detailed street-level maps (just 100MB to load on your PC), Door-to-Door CoPilot provides up-to-the minute, turn-by-turn *audio* instructions. Why, it's like having your own backseat driver. Get it for $350, and you need never drive with humans again! TravRoute Software, 888/872-8768, www.travroute.com

READER SERVICE NO.720

Legtop Podeum

Get a leg up on the competition and turn your thigh into a desk-on-the-run with Rach's Legtop Podeum. Just wrap the Velcro straps around your leg, place your PC on the padded Velcro mounting surface, and the office is open. Now you can compute at angles up to 90 degrees. You may never go back to a real desk again! And in this amazing offer, your combination working platform and carrying case costs just $79.99. Wow! Get two, and compute cheek to cheek. Rach Inc., 800/942-4902, www.podeum.com

READER SERVICE NO. 721

—M. S. L.

vention center—the NoiseBuster lets you hear *only* what's coming through the speakers, not what's around you. Push the special airplane button on the audio enhancer and the NoiseBuster headphones all but cut out jet engine noise. In the office, use the unit as a headset with its mike for Internet phone conversations or voice recognition software. Or, better yet, just tune out the sounds of your coworker in the next cube slurping soup or chattering away.

—*Grace Aquino*

Noise Cancellation Technologies, $129, without microphone $69, 800/278-3526, 203/961-0500, www.nct-active.com

READER SERVICE NO. 697

Kensington CD Drive Cleaner

It's in the Scan

PaperPort Strobe

Visioneer's versatile PaperPort Strobe is a sleek, lightweight color scanner the size of a three-hole paper punch. But don't let its midnight blue color or compact size (just 1.5 pounds) fool you: The PaperPort Strobe works with everything from business cards to photographs and letters, producing first-rate color and monochrome scans in seconds (24-bit, 300-by-600-dpi color and monochrome). Visioneer's PaperPort 5.1 software, which launches automatically when you put paper in the PaperPort Strobe, makes scanning and exporting scanned images into other applications a snap, even for novices. Sure, you can find sheetfed scanners at about half the price these days, but they won't be nearly as smart, speedy, or sexy.

—*Yardena Arar*

Visioneer, $250, 800/787-7007, www.visioneer.com

READER SERVICE NO. 698

PaperPort Strobe

on the road

Sharp SE-500

Help for the Terminally Lost

Etak SkyMap

Are you a lousy navigator? Excuse me, geographically challenged? Let Etak's SkyMap be your guide. Using the Global Positioning Satellite system, SkyMap pinpoints your location on a digital map anywhere in the U.S. The device plugs into a PC Card slot on your notebook and includes two map CDs and a remote control. I let SkyMap guide me to a friend's cabin in the middle of nowhere and found it amazingly accurate as well as fun to use. Not only did it keep me on track as I drove, it also showed points of interest along the way. —*Tracey Capen*

Etak Inc., $299.95, 888/275-9627, www.etak.com/skymap

READER SERVICE NO. 699

The Paper-Thin PDA

REX PC Companion

Ever wished you could store all your personal and professional contacts on something the size of a business card? The Rolodex REX could be your dream come true. A PC Card that fits into any Type II slot in a notebook PC, REX comes with, amazingly, a crisp black-and-white LCD screen and five command buttons. Better yet, REX holds up to 2500 appointments, contacts, to-do items, and memos; simply download them to the device by shoving REX into a notebook's PC Card slot or in the REX serial Docking Station on a desktop PC. Alas, to send data *to* the card, you must use the REX TrueSync Information Manager on your desktop. But at 1.4 ounces and small enough to fit in your wallet, the REX is truly a high-tech, low-weight PIM. —*M. S. L.*

Franklin Electronic Publishers, REX 1, 750 items $129; REX 3, 2500 items and docking station $179; 888/739-6400, www.franklin.com

READER SERVICE NO. 700

Pilot Lite

Sharp SE-500 Mobile Organizer

With the runaway popularity of 3Com/U.S. Robotics' PalmPilot PDA, it comes as no surprise that another vendor would try to copycat the PalmPilot's success. Enter Sharp's sleekly engineered

Etak SkyMap

SE-500, a $299 1MB mobile organizer that sends and receives Internet e-mail and handles contacts, appointments, expenses, and memos. The SE-500 is larger and a tad heavier than the Pilot (is that Pilot Envy?), but it has a larger screen, a built-in 14.4-kbps modem, and an infrared port for wireless communication. The SE-500 syncs to your PC with leading PIMs such as Outlook 97, ACT 3.0, and Lotus Organizer 97. Unlike the PalmPilot, it does not rely on the Graffiti handwriting language for data input. Instead, users create notes in their own handwriting (thank you); the notes can then be linked to any record or sent as bitmap e-mail attachments. An on-screen tap-and-hunt keyboard is also available for text entry. —*M. S. L.*

Sharp Electronics Corp., $299, 800/237-4277, www.sharp-usa.com

READER SERVICE NO. 701

Small Alarm, Big Noise

DEFCON 1 Notebook Security System

Quick quiz: What's small and loud and guards your notebook? It's DEFCON 1, a 110-decibel, attention-grabbing alarm. Push the alarm's steel cable through your notebook's handle, wrap it around an immovable object, and then attach the cable back into the alarm. If the cable's cut, the alarm starts howling. Better yet, set the alarm's time-delay motion sensor. That way, if the DEFCON or your notebook is disturbed—shaken, tilted, ▶

ILLUSTRATION: GLENN MITSUI

REX PC Companion

I'M PRINTING OUT SOMETHING THAT WILL REALLY DAZZLE MY CLIENTS.

I GUESS THAT RULES OUT MY REPORT CARD.

PHOTOGRAPHY

REPORT CARD

It's more fun with a Lexmark.

No matter what you print from your home office, you'll want to do it with a Lexmark.

Our new Lexmark 7200 color printer, with Lexmark EX2 Technology,™ meets even your toughest customers' needs with laser-quality text and photo-realistic images, even on plain paper. So you produce eye-popping charts, spreadsheets and sales brochures, all printed faster than you could imagine.

It makes sense. All we make is printers, so all we think about is how to make them more productive (and more fun to use).

Call us at 1-800-539-6275, or visit us at www.lexmark.com and find out how a Lexmark can help you make it big.

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Circle 141 on reader service card

The perfect balance of power.

Why weigh yourself down? The Phenom handheld PC has the power to keep you connected and keep you working. With its built-in fax/modem, you can send and receive e-mail and faxes. Powered by Windows CE 2.0, you can work in pocket versions of Word, Excel, and Internet Explorer. What's more, with its Pocket PowerPoint Viewer, the Phenom can show your presentations on any VGA display.

The Phenom has a wide 640x240 backlit screen, an easy to type keyboard and voice memo capability. Also included are rechargeable batteries, a built-in charger, docking station, and power adapter. In short, the Phenom is the most complete handheld PC solution out there.

Get your hands on the phenomenally portable Phenom handheld PC. For information, contact **800-243-0000** or **www.lg**phenom**.com.**

Designed for Microsoft® Windows® CE

Handheld PC

LG PHENOM

We Put People First

LG Electronics

Circle 134 on reader service card

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tipped—you have 4 seconds to disarm the gadget with the correct combination before the screeching starts. (Or use DEFCON to keep the cat off the furniture.) *–S. B.*

Port, Inc., $49.95, 800/242-3133, 203/866-0221, www. portinc.com

READER SERVICE NO. 702

Running Out *With* Time

Ironman Triathlon Watch

Whether you're on the run at work or just going for a run afterward, Timex's new Data Link watch can match you stride for stride. The rugged and sporty Ironman Triathlon watch uses PC software that lets you enter appointments, phone numbers, and other personal information on your PC, then transfer it all to the watch. Hold the Ironman up to your computer monitor, and your data is relayed by flashing bar-code scan lines to an "eye" on the watch face. You can create custom chronograph and timer settings, set reminders and alarms, and best of all, store up to 38 phone numbers on the watch. Then get ready to hit the fast track. *—Angela Freeman*

Timex Corp., $70 street, 800/367-8463, www.timex.com

READER SERVICE NO. 703

Keyboard to Go

H45 QuickPad

Here's an innovation: a keyboard that doesn't require a PC. Sure, H45's QuickPad can serve as a wireless keyboard for your desktop system or even your notebook PC. But you can also use it as a 1-pound portable text editor, viewing your work on its 40-character-by-4-line LCD screen and storing it in the unit's 128K of memory. When you return to the PC, it's a snap to quickly upload text directly into any word processor or other program. Mind you, QuickPad's no notebook replacement—among its other limitations, it works only in one direction: you can't download text from a PC. But as an electronic notepad, it's unique and useful. *—Harry McCracken*

H45 Technology, $199, 800/220-6346, www.h45.com

READER SERVICE NO. 704

DEFCON 1 Security System

Page Turner

Socket PageCard

When is a pager more than a pager? When it's the Socket PageCard. This PC Card works as either a stand-alone pager or a wireless data receiver for notebooks or handheld PCs. Its two-line LCD screen displays up to 350 numeric or text messages. But insert the 2.2-ounce card into your PC's or PDA's PC Card slot, and you can send messages via modem to any alphanumeric pager, as well as download data, forward e-mail, get stock market updates, and check your calendar. Other services are available by subscription with GTE Advanced Messaging Services. *—M. S. L.*

Socket Communications, $249 plus monthly service charges, 510/744-2700, www.socket.com

READER SERVICE NO. 705

DVD/DVD-ROM

No Ware to Run

You'd think a DVD player or DVD-ROM drive would be the ultimate holiday gadget. The technology promises laserdisc-quality sound and video for movies, PC games, and multimedia apps. But months after DVD players hit store shelves, the new format still offers more promises than it does software.

A DVD original—Tex Murphy: Overseer.

Sure, you'll find an odd assortment of DVD movies from major Hollywood studios such as Warner Bros. and MGM, with a handful more from latecomers like Universal/MCA and Disney.

But the few DVD-ROM titles you can find are reminiscent of early CD-ROMs. In a word: shovelware. Some publishers have merely taken titles that exist on multiple CD-ROMs, like The Daedalus Encounter or Phantasmagoria II, and mastered them onto one DVD. To date, about a dozen previously released games and some 20 multimedia and reference titles are offered on DVD-ROM. A few original DVD titles are promised for delivery by the time you read this, including Access Software's Overseer, the third installment of the Tex Murphy graphic adventure series.

A bucketful of new titles and a shelf's worth of shovelware are not particularly compelling reasons to invest $400 or more for a DVD machine. True, DVD-ROM drives will read CD-ROMs, so you can use them while you wait for DVD titles. But for now DVD is like Gertrude Stein's description of Oakland: There's no ware there. **–M. S. L.**

Going Up?

Get off at the top with ATI's All-in-Wonder Pro.

Just install one board – the ATI All-in-Wonder Pro and take your PC to new multimedia heights. All-in-Wonder Pro – the newest and fastest member of the All-in-Wonder family.

Watch TV on your computer. Monitor your favourite channel in the background while using other applications. Display games and presentations out to a big screen TV. Accelerate 3D graphics to make your computer games explode and your design projects sizzle. Capture video from your TV, VCR, or camcorder and display high quality video, including MPEG, at full screen or in a window.

If you've wanted to upgrade your PC but didn't know which way to go – buy ATI's All-in-Wonder Pro and get all of these upgrades for one price in one box.

To feel the thrill of the All-in-Wonder Pro experience check out our website for a really cool demo of these incredible features – at www.atitech.com/pcwld

Get ATI All-in-Wonder Pro and get off at the top!

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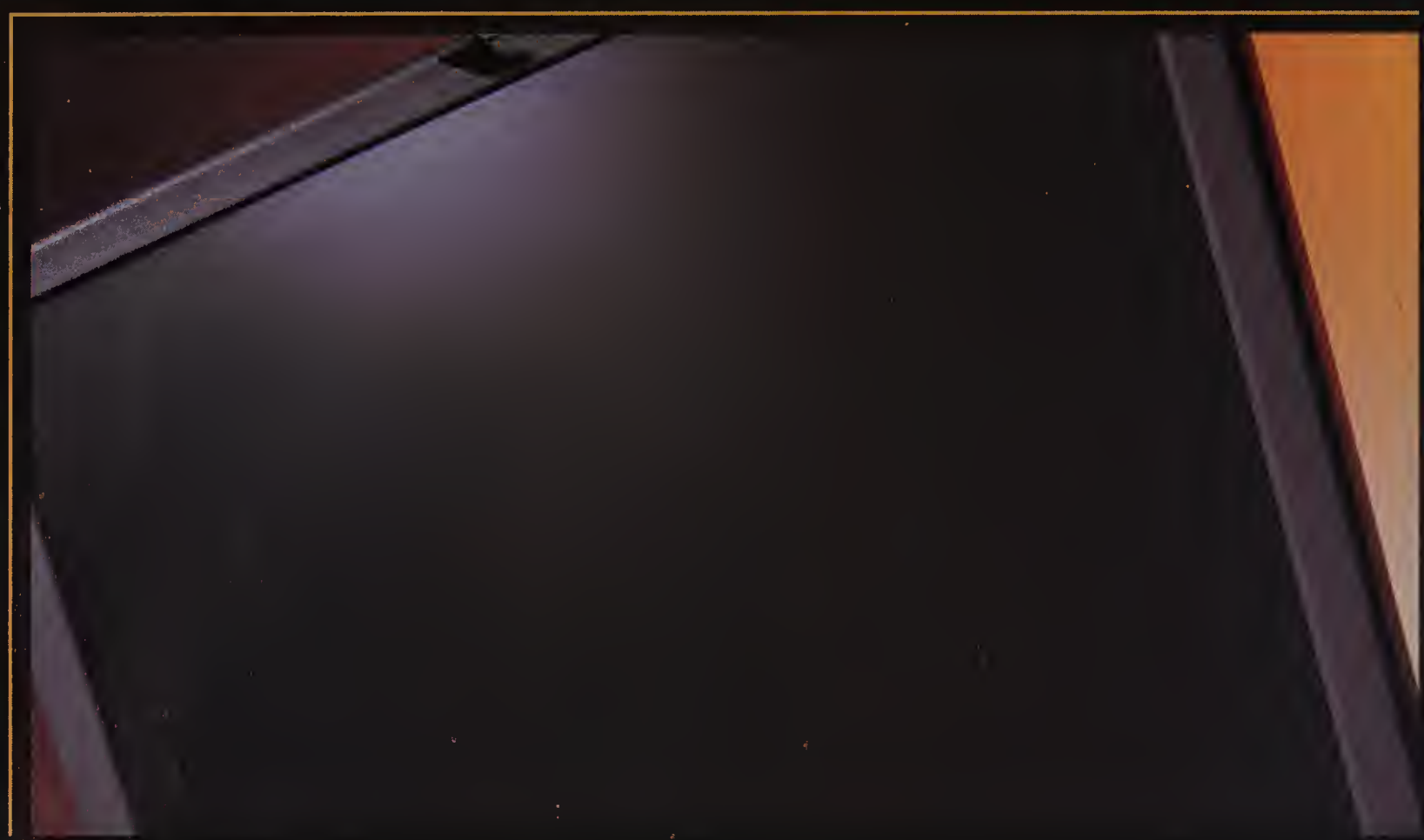
See ATI at IVCC #1682

Now You See It.™

www.atitech.com/pcwld

Circle 5 on reader service card



THE NEW HP OMNIBOOK 3000

HIGH PERFORMANCE, GREAT PRICE.

(MUST BE THE GENE POOL.)

MMX™ intel inside pentium® PROCESSOR

We're proud to announce a new addition to our family of highly acclaimed notebook PCs. The HP OmniBook 3000 is a high-performance notebook with something seldom found in a high-performance notebook: an affordable price. The OmniBook 3000 comes with the very latest Intel® 200 MHz or 233 MHz Pentium® processor with MMX™ technology, as well as an advanced 13.3" XGA TFT screen. And

HP OmniBook 2000
Value

HP OmniBook 800
Light weight

HP OmniBook 5700
High performance

like its OmniBook siblings, the 3000 has inherited our unsurpassed reputation for quality and outstanding service and support. So if you've been thinking about getting an OmniBook, only one question remains. Which one? For more information, visit our quick link:

www.hpresource.com/omnibook3000

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Web Walkman

Listen Up Player

Just when you thought it was safe to leave your PC, here comes the Internet-to-Go. The Listen Up Player, a pager-size 4-ounce device, will record voice memos, but its main function is to play a wide array of free programming—up-to-date news and finance reports, self-help lessons, audio books, music, and more—all downloaded from Audio Highway's Web site. The unit stores up to an hour of content you can listen to from its internal speaker, via headphones, or through car speakers, using an included adapter. After downloading from the Web to your PC, transfer to the device takes a few minutes with an included docking station. —*M. S. L.*

Audio Highway, $199, 800/775-4783, www.audio-highway.com

READER SERVICE NO. 706

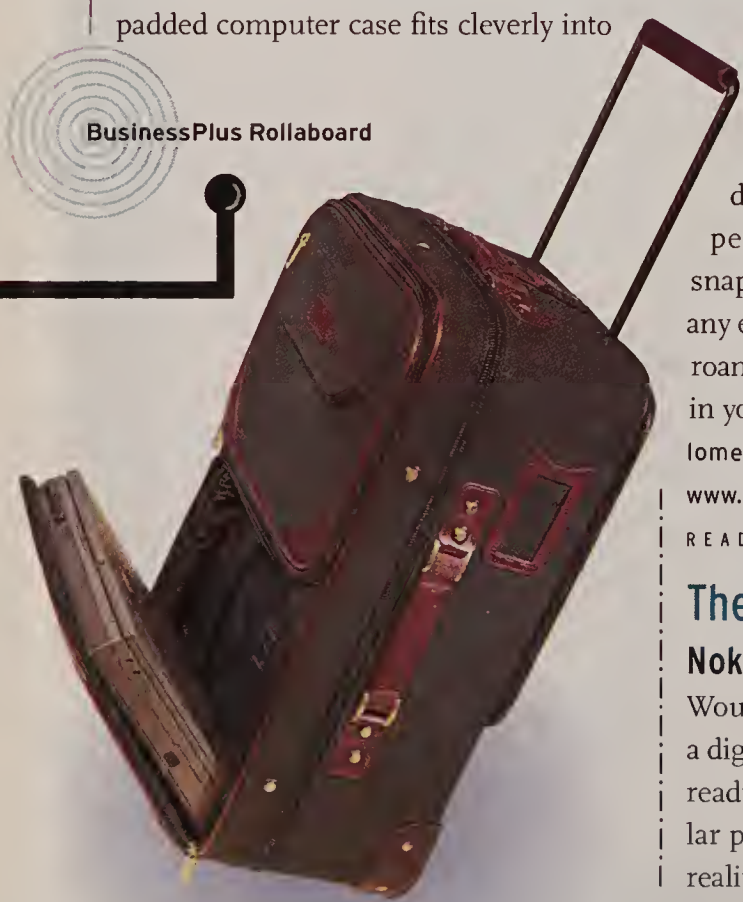
The Murphy's Law Bag

BusinessPlus Rollaboard

Orvis's BusinessPlus Rollaboard bag can conquer just about all of Murphy's Laws of Travel. *Law 1*: Your flight will always leave from the farthest gate. Solution: This overnight bag sports built-in wheels and a pullout handlebar so you can roll it with ease—no matter how heavy the load or how long the hike. *Law 2*: Increasingly crowded flights force you to check your bag. Solution: The Rollerboard's unique padded computer case fits cleverly into the bag's top lid and can be quickly removed via either of two zippered pockets, so you can easily retrieve your notebook computer if you have to check the big bag. *Law 3*: You are assigned a middle seat for that 5-hour flight (sorry, the bag won't help you here). —*M. S. L.*

Orvis, $275, 800/541-3541, www.orvis.com

READER SERVICE NO. 707



BusinessPlus Rollaboard

Listen Up Player

Zip Unleashed

Nokia 9000i Communicator

A Removable Feast

Zip Unleashed

Iomega's Zip Drive revolutionized the way we save data. With 70 times more storage than a regular 1.44MB floppy, 100MB Zip disks have proven indispensably convenient. But with Zip Unleashed, Zip drives are no longer shackled to the desktop. Little larger than a deck of cards, this battery pack for any Zip drive provides about 3.5 hours of juice per charge. Recharging is literally a snap: A recessed plug snaps out to fit in any electrical outlet. No matter where you roam, Zip Unleashed can put the zip back in your drive. —*M. S. L.*

Iomega Corp., $49.95, 800/697-8833, www.iomega.com

READER SERVICE NO. 708

The Amazing Cell Phone PC

Nokia 9000i Communicator

Wouldn't it be great if one gadget housed a digital phone, a fax machine, *and* a Web-ready handheld computer? Finnish cellular phone giant Nokia turns fantasy into reality with the Communicator. Using the new GSM 1900 cellular network, the unit looks like most other cell phones; open up the clamshell, and you'll find an 8MB PDA powered by an Intel 386 chip that uses the GEOS 3.0 O/S. While the keyboard is for hunt and peck only, the 640-by-200 LCD screen offers crisp resolution, and the built-in apps launch easily via dedicated buttons. Find a name in the contact list, click-dial, and the phone snaps into operation. Browse the Web and get text *and* graphics. With the Nokia 9000i you could go on the road and never have to come back. —*M. S. L.*

Nokia Mobile Phones, $999, 800/666-5553, www.nokia-americas.com

READER SERVICE NO. 709

Shark Bytes

Shark 250

Is your hard drive crammed to the gills? Instead of upgrading to a larger drive, consider Avatar Peripherals' Shark 250. The sleek device weighs 10 ounces, delivers data about as fast as most hard drives (a video clip I ran from the Shark played fluidly without missing a frame), and plugs into a notebook or desktop PC via parallel port or PC Card. Best of all, it stores a whopping 250MB on removable Shark cartridges (or is that cartilage?) that cost about $39 each, or 16 cents per ▶

9:23 a.m.
Check stocks. Market up.

11:16 a.m.
Check stocks. Market way up.

1:33 p.m.
Check stocks. Market way, way up.

1:34 p.m.
Surf car websites.

16 gray-scale back-lit screen

80-column full-width screen

8MB memory

Wireless e-mail and Internet access via Type II PC card modem.*

Designed for Microsoft® Windows® CE

HP 360LX Palmtop PC

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www.hp.com/handheld

*Modem is optional. The Windows CE logo is a trademark of Microsoft Corporation. ©1997 Hewlett-Packard Company PPG478

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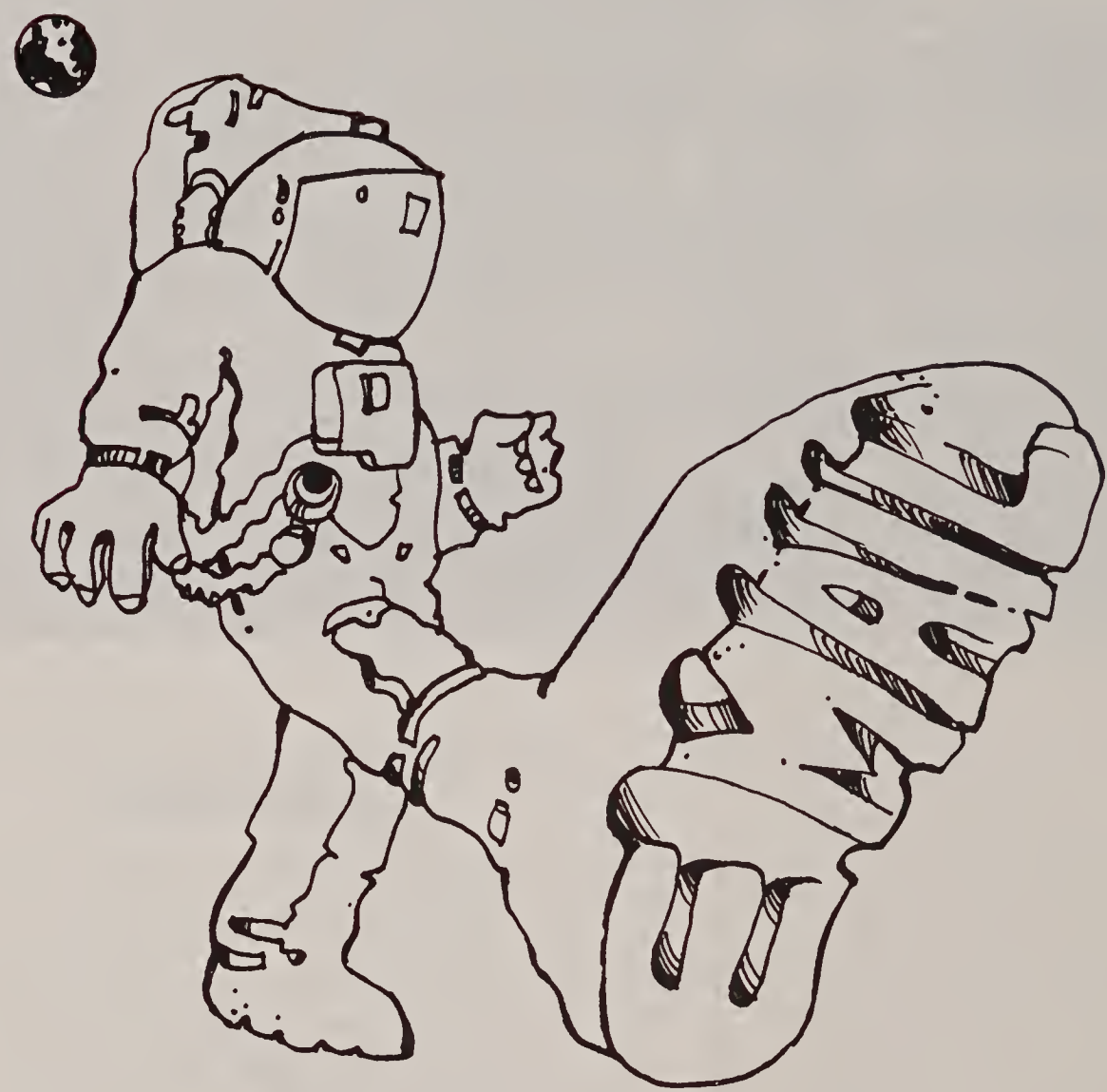

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*1997 CNI research evaluation of Novell GroupWise, Lotus Notes, and Microsoft Exchange.

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Imagine, e-mail that goes where no e-mail has gone before.
Using the Internet as its launching pad, e-mail that can circle the planet to make workgroups work.
Expanded e-mail that makes users six times more productive than users of competitive products.*
With the freedom, flexibility, and friendliness of an out-of-the-box solution—
that can still be easily optimized to your needs.
And can leverage your existing network investment for maximum impact at minimum cost.

Novell® GroupWise 5.2 makes it possible.

GroupWise® 5.2 technology is as easy to use as ordinary e-mail,
but offers a rich array of expanded capabilities—such as calendaring and scheduling, document management, workflow, imaging,
threaded discussions and status tracking—that takes ordinary e-mail out of this world.
And puts a whole new world of productive tools within reach of any user, any browser, any platform,
any server (yes, even NT). It's also Java®-enabled, easy to learn and easy to administer.
It's no wonder nearly three out of four people who try GroupWise, buy it.
So try it—FREE. Get a free three-user CD version of the full product by calling 1-800-778-1850 or download it from our Web site.
It's a small step for you—but a giant leap for your business.
www.novell.com/groupwise/leap

Novell®

GROUPWISE

MB. Mask and fins are extra. —*M. S. L.*

Avatar Peripherals Inc., $199, 888/462-8282, www.goavatar.com

READER SERVICE NO. 710

Pocket Powerhouse

Psion Series 5

Palmtop computers have tried numerous methods to squeeze a usable keyboard into a pocket-size device. But the Psion Series 5's ingenious fold-out keypad is the first one you can actually type on. Overall, the Series 5 beats Windows CE palmtops thanks to its large screen, suite of extremely powerful built-in applications, digital voice recording, and easy data exchange with Windows 95 desktop and notebook PCs. —*H. M.*

Psion, Inc., 4MB model $599, 8MB model $699, 978/371-0310, www.psion.com

READER SERVICE NO. 711

Shark 250

Pager on Steroids

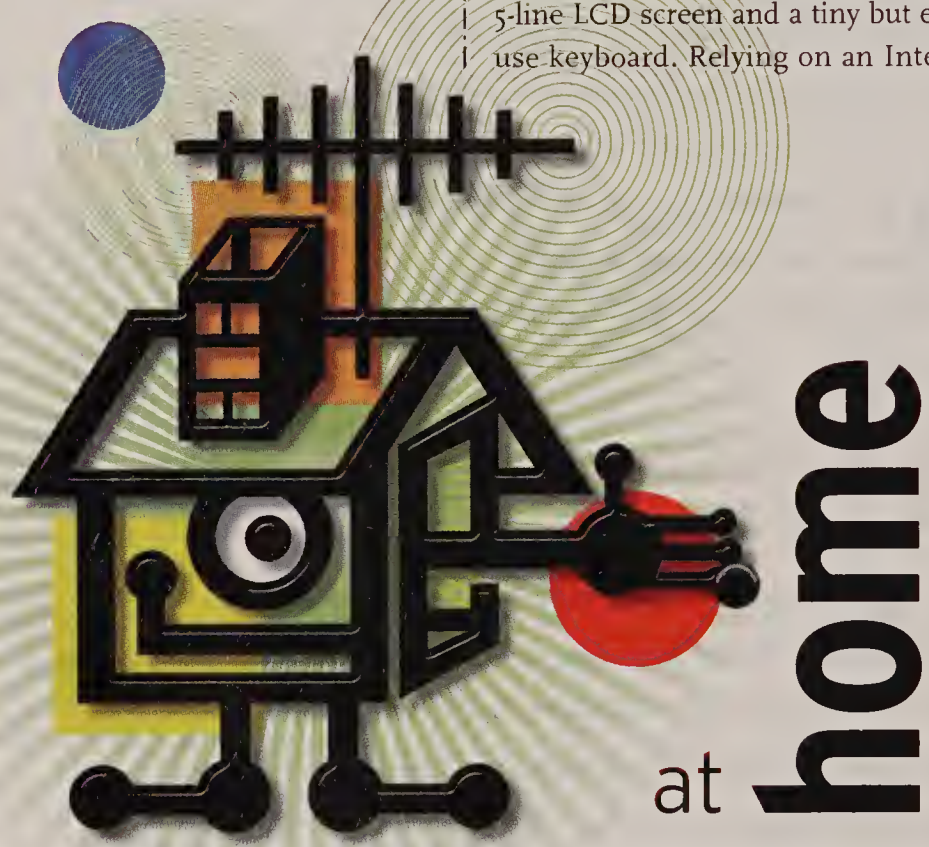
Inter@ctive Pager

Pagers aren't for wimps anymore. No ordinary snug-on-your-belt device, this 3.9-by-3-by-1.4-inch unit weighs about half a pound. That's because it opens up clamshell style to reveal a 30-character-by-5-line LCD screen and a tiny but easy-to-use keyboard. Relying on an Intel x86-compatible CPU, its DOS apps offer Internet text e-mail and one- and two-way information services from a corporate intranet or the Internet. Two-way paging, text-to-fax and text-to-speech messaging, contact records, and calendars are bundled in the services that come with this muscular gizmo. —*M. S. L.*

Research In Motion, $575 to $699 depending on network, 519/888-7465, www.rim.net

READER SERVICE NO. 712

Psion Series 5



at home

PC Star Maker

Connectix Color QuickCam 2

My Labrador, Samantha, loves to be in pictures. With Connectix's $199 Color QuickCam 2, I made her a movie star in minutes. This round camera, smaller than a tennis ball, sits on your desk or PC monitor. Plug the camera into your PC's keyboard port, plug the keyboard into an adapter, connect a second plug to the parallel port, and you're set. Still pictures and videos both look good. But Connectix doesn't supply a printer pass-through, so you'll have to unplug the camera when you need to print. And the video files are huge: A 2-minute movie took 7.5MB. Fortunately, you can compress the files (my short film compressed to 2MB), though

ILLUSTRATION: GLENN MITSUI

Connectix Color QuickCam 2

Print With Flying Colors

Canon BJC-80

Talk about printing on the fly: Canon's portable color ink jet printer weighs 3 pounds and prints decent colors, and with its 200-pages-per-charge battery pack, you really *can* print while on a plane. Snap in a $99 scanning cartridge to turn the ink jet into a portable color copier. Resolution is 720 by 360 dots per inch, the same as on some of Canon's heavy-duty Bubble Jet desktop printers. Monochrome prints at 4 pages per minute, color at 2 ppm. An infrared port allows wireless printing with similarly equipped notebooks. —*M. S. L.*

Canon Computer Systems, Inc., $299, 800/848-4123, www.ccsi.canon.com

READER SERVICE NO. 713

The ultimate weapon for the road warrior.

Imagine making a PC-based presentation without a PC! Although the PT-L555U is fully "plug and play" compatible with your PC, the PT-L555U's built-in PCMCIA memory card system lets you make "PC-less" presentations using the projector alone!

Small enough to fit in a briefcase and light enough to carry anywhere (just 11lbs), the Panasonic PT-L555U provides an ultra bright, uniform picture (450 ANSI lumens) and outperforms bulkier, more costly projectors. (This outstanding performance is backed by a 3-year warranty*.) The PT-L555U's supplied remote mouse control comes complete with built-in presentation tools and is designed for the utmost ease-of-use.

Whether you're a travelling salesman or a board director; if business is war, the PT-L555U is the *ultimate weapon.*

THE PANASONIC PT-L555U
ULTRA-PORTABLE LCD PROJECTOR

* Lamp light has a 90-day warranty.

Lose up to 10 lbs!
Leave your PC in the office.

Advanced Intelligent compression
for true XGA performance.

Free leather carrying case with
purchase. Offer expires Jan.31, 1998.

Panasonic
Broadcast & Digital Systems Company

Contact us at **800 528 8601** (Upon request enter Product Code 25) or contact us at http://www.panasonic.com/presentations

you must send recipients a special decompression app. This holiday season, you can send cards with a movie greeting via e-mail. Mine will include a good deal of barking. —*L. M.*

Connectix $199, 415/571-5100, www.connectix.com

READER SERVICE NO. 714

PCs Call Home

PC OnCall

Imagine this: You're in a hotel a million miles from home. You need a file on your home office computer, and you need it now. With Belkin's PC OnCall, it's remarkably easy. Just call home using a touch-tone phone. PC OnCall powers up your computer and loads Co-Session, a remote control software program. Then you fire up your notebook, link to your home computer, and voilà, you have complete access. PC OnCall can set your system to accept incoming faxes, and it provides surge protection for itself and two peripherals. —*S. B.*

Sidewinder Force Feedback Joystick

Belkin $129, 800/223-5546, 310/898 1100, www.belkin.com

READER SERVICE NO. 715

Eye Spy

CoolShot KXL-600A

Panasonic's CoolShot looks like something James Bond would carry in his shirt pocket. The trim $399 digital camera fits easily in one hand; a $219 color LCD displays your snaps instantly (you can also view them on a TV). You upload the pix via an included serial interface cable or a 2MB memory card that plugs into a notebook PC Card slot. But with no flash option, you won't be taking many shots in the dark, and even well-lit pictures seem a tad drab. Fortunately, CoolShot's image editing software lets you spruce up the colors, brightness, and contrast. After all, digital images were made to be doctored, no? —*Daniel Tynan*

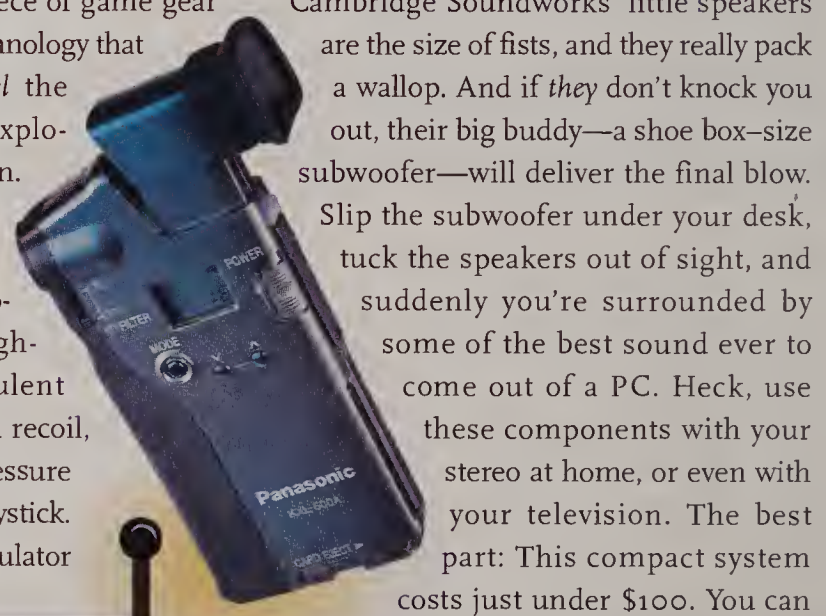
Panasonic, $399, 800/742-8086, www.panasonic.com/alive

READER SERVICE NO. 716

Luke, Feel the Force!

Sidewinder Force Feedback Joystick

You've almost got radar lock. You gently pull back your joystick, get tone, call Fox Two, then turn that MIG 29 on your tail into digital shrapnel. But the thrill of the kill seems so two-dimensional. Not so with Microsoft's Sidewinder Force Feedback Joystick. This slick piece of game gear uses digital-optical technology that actually lets you *feel* the ups, downs, and explosions on your screen. With nausea-inducing efficiency, Sidewinder's on-board processor translates high-speed turns, turbulent weather, machine-gun recoil, and more into back pressure and vibration on the joystick. Microsoft's Flight Simulator and some 30 other games will support the Force. Yes, at $149.95 it's nearly as expensive as a Pentagon contract, but serious gamers will love it. —*K. S.*



CoolShot KXL-600A

PCWorks Speaker System

Microsoft, $149.95, 800/426-9400, www.microsoft.com

READER SERVICE NO. 717

Lightweight Speakers, Heavy Sound

PCWorks Speaker System

Cambridge Soundworks' little speakers are the size of fists, and they really pack a wallop. And if *they* don't knock you out, their big buddy—a shoe box–size subwoofer—will deliver the final blow. Slip the subwoofer under your desk, tuck the speakers out of sight, and suddenly you're surrounded by some of the best sound ever to come out of a PC. Heck, use these components with your stereo at home, or even with your television. The best part: This compact system costs just under $100. You can find larger, louder-looking speakers out there, but most of them don't sound as good as this compact system. —*B. G.*

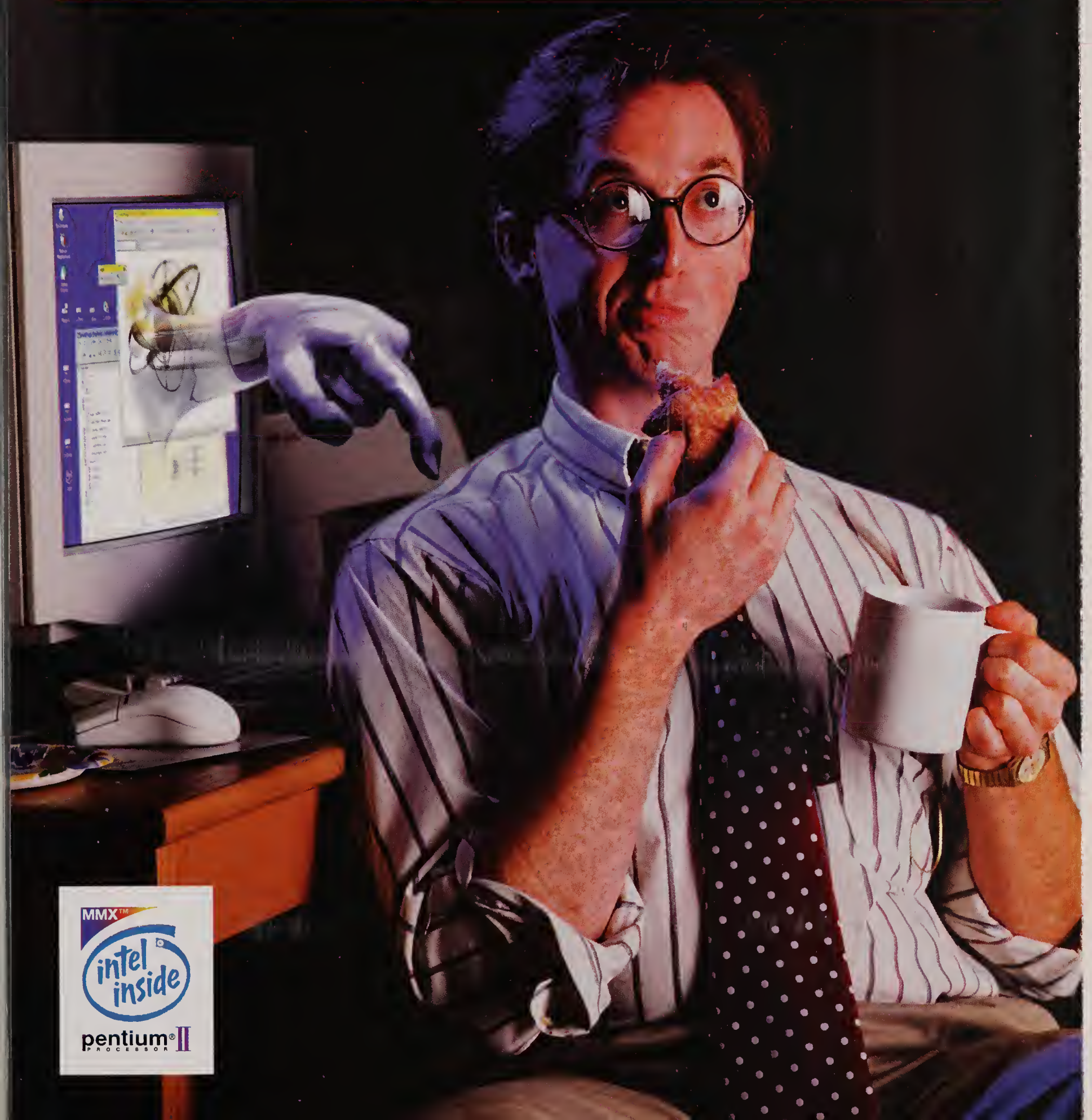
Cambridge SoundWorks, $99.95, 800/367-4434, www.hifi.com

READER SERVICE NO. 718

PC OnCall

Michael S. Lasky is senior associate editor at PC World. *Grace Aquino, Yardena Arar, Tracey Capen, Angela Freeman, Brad Grimes, Harry McCracken, Laurianne McLaughlin, JoAnne Robb, and Daniel Tynan are editors at* PC World, *and Steve Bass, Lincoln Spector, and Kirk Steers are contributing editors.* ■

Wouldn't it be great to have a full-time tech expert in your PC, alerting you to possible problems before they happen?



(Comforting thought, isn't it?)

Quantex has always built its machines to last, and backed them up with award winning tech support, second to none. Now, working hand in hand with Intel and utilizing their LANDesk® Client Manager Technology (LDCM), we've taken "support" to new heights. LDCM, a technology designed to monitor your PC's health and provide early warnings of potential PC problems, was originally developed for large businesses. Quantex now makes this technology available in a user-friendly format for individual and small business users.

LDCM automatically loads each time your PC is turned on, and runs in the background while you work. It continuously checks on the condition of your computer, and sends you a visual warning upon recognizing potential problems. A simple click of the mouse will inform you of a number of possible solutions to consider. If additional assistance is required, a system analysis print out can be sent to a Quantex technician to facilitate a quick resolution.

By catching a problem before it becomes a problem, there's no costly downtime. No lost productivity. And no worries. Which is the way it usually is with Quantex PC's. Only now, even more so.

We're always behind you.

Quantex provides toll-free technical assistance, anytime day or night, seven days a week. Live human beings, not recordings, provide fast, friendly help. A recent survey of "Great Tech Support" gave us a rating of "Excellent" in our ability to handle any kind of technical problem quickly and inexpensively. See for yourself!

OVERALL RANKINGS

PC VENDOR	GRADE
Quantex	Excellent
Dell	
Hewlett-Packard	
IBM	
Compaq	Good
Gateway 2000	
Micron	
NEC	
Acer	Fair
AST	
Toshiba	
AT& T	Poor
Digital	
Packard Bell	

Windows Magazine, 8/97

WOULD YOU BUY AGAIN?

VENDOR	% WHO WOULD BUY THE SAME BRAND
Dell	92%
Quantex	91%
Hewlett-Packard	89%
IBM	89%
Micron	81%
Gateway	80%
Acer	74%
AST	74%
NEC	71%
AT& T	69%
Digital	69%
Toshiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 8/97

VENDOR RATING

System Reliability - **"good"**

Support Quality/policies - **"good/best"**

PC World 11/97

Quantex is always one step ahead

At Quantex, we're in touch with the needs of small businesses (after all, we were one once!). As a company with years of experience manufacturing high quality, award-winning system solutions, we've become pretty savvy about delivering the perfect solutions to the most discriminating buyers.

Our powerful business workstations provide high levels of reliability and performance, and are enhanced by Microsoft's preferred operating system for businesses of all sizes, Windows NT. This "crashproof" operating system offers increased system security and the benefit of the same familiar look and ease of use of Windows 95. It allows you to keep your most important files private, and runs your 32-bit applications up to 24% faster.

Like all Quantex products, these business workstations offer further reliability with name brand components from some of the most respected manufacturers in the industry. Give us a call, and let our system consultants work with you in making sure you select systems perfectly suited to your business' needs.

Purchasing PC's for your small business is an important investment, so choose wisely - choose Quantex as your "small business partner."

QP6/266 WS-3x $2449
(featuring Pentium® II processor)

Business lease: $85/Mo.

- 266MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 2 Universal Serial Bus (USB) Ports
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (16.1" viewable)
- K56flex protocol Fax/Modem w/Voice Mail and Speakerphone
- 24X Max EIDE CD-ROM Drive
- ATX Case
- 104-Key Keyboard with MS PS/2 Mouse
- MS Windows NT 4.0 Workstation
- MS Office '97 Small Business Edition
- 3-year limited warranty, 24-hr./7-day Technical Support
- Quantex PC Health Monitoring & Support based on LDCM

QP6/233 WS-3x (featuring Pentium® II Processor)..$2299
QP6/300 WS-3x (featuring Pentium® II Processor)..$2649

Workstation Series

Standard Features ■ STB Nitro3D w/4MB SGRAM ■ 3CDM 3c509 ISA Combo NIC ■ 24X Max EIDE CD-RDM Drive ■ 104-Key Keyboard with MS PS/2 Mouse ■ MS Windows '95 with MS Plus

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- Mini-Tower Case
- 2 Universal Serial Bus (USB) Ports
- 3-year limited warranty, 24-hr./7-day Technical Support
- Quantex PC Health Monitoring & Support based on LDCM

QP5/200 WS-1 (with MMX™ Technology).....$1299
QP5/233 WS-1 (with MMX™ Technology).....$1399

QP5/233 WS-2 $1699
(with MMX™ Technology)

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- 32MB EDO Memory / 512KB Pipeline Burst Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor (16.1" viewable)
- Mid-Tower Case
- 2 Universal Serial Bus (USB) Ports
- 3-year limited warranty, 24-hr./7-day Technical Support
- Quantex PC Health Monitoring & Support based on LDCM

QP5/166 WS-2 (with MMX™ Technology).....$1499
QP5/200 WS-2 (with MMX™ Technology).....$1599

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QP6/266 M-4x SE — $2799
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- Altec Lansing ACS-45 Speakers w/subwoofer
- Includes all Standard Features
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QP6/233 M-4x SE (featuring Pentium® II processor).....$2649
QP6/300 M-4x SE (featuring Pentium® II processor).....$2999

QP6/300 M-4x — $2499
(featuring Pentium® II processor)
Business lease: $87/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory /512KB Secondary Cache
- 5.1GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-90 Speakers
- Includes all Standard Features
- Quantex PC Health Monitoring & Support based on LDCM

QP6/233 M-4x (featuring Pentium® II processor).....$2199
QP6/266 M-4x (featuring Pentium® II processor).....$2299

The competition can't measure up to our award-winning systems.

Recently, our multimedia systems were awarded some of the industry's highest honors by *PC World* (11/97). Our QP5/200 SM-1 won praise as a "**Best Buy**", and was bestowed the number three spot in the Budget Desktop category. And, in the the Power Desktop category, our featured system, the QP6/266 SM-4x, achieved an honorable number six ranking. No surprise - it combines the biggest picture (19" Digital Monitor), the fastest CPU (300MHz Pentium® II processor), the largest hard drive (8.4GB EIDE), and the most stunning graphics available (128-bit Riva 128 3D AGP Card), all for less than you'd ever thought possible.

QP6/300 SM-4x — $2999
(featuring Pentium® II processor)
Business lease: $105/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- Upgrade to AGP Matrox Millennium II 3D w/8MB WRAM for only $149
- 19" Digital Monitor (18.1" viewable)
- Altec Lansing ACS-45 Speakers w/subwoofer
- Includes all Standard Features
- Quantex PC Health Monitoring & Support based on LDCM

QP6/233 SM-4x (featuring Pentium® II processor) $2699
QP6/266 SM-4x (featuring Pentium® II processor) $2799

QP6/300 SM-4x SE — $3199
(featuring Pentium® II processor)
Business lease: $104/Mo.

- 300MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 19" Digital Monitor (18.1" viewable)
- Toshiba 2nd-Generation DVD-RDM Drive
- DVD Decoder Board
- Altec Lansing ACS-490 Speakers w/subwoofer
- Includes all Standard Features
- Quantex PC Health Monitoring & Support based on LDCM

QP6/233 SM-4x SE (featuring Pentium® II processor) $2899
QP6/266 SM-4x SE (featuring Pentium® II processor) $2999

Value Multimedia Series

Standard Features ■ 2 Universal Serial Bus (USB) Ports ■ K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone ■ 24X Max EIDE CD-RDM Drive ■ Ensoniq 32-bit Wavetable Sound Card ■ 104-Key Keyboard with MS PS/2 Mouse ■ Duantex Tower Case ■ MS Windows '95 with MS Plus ■ 3-year limited warranty, 24-hr./7-day Tech Support ■ Intel Videophone Ready ■ Value Multimedia Software

QP5/166 M-1 — $1349
(with MMX™ Technology)
Business lease: $47/Mo.

- 166MHz Pentium® Processor with MMX™ Technology
- 24MB EDO Memory / 512KB Pipeline Burst Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB SGRAM
- Upgrade to Matrox Mystique 220 w/4MB SGRAM and Rainbow Runner for only $99
- 15" Digital Monitor (14.0" viewable)
- Altec Lansing ACS-90 Speakers
- Duantex PC Health Monitoring & Support based on LDCM

QP5/200 M-1 (with MMX™ Technology).....$1449
QP5/233 M-1 (with MMX™ Technology).....$1549

QP5/233 M-2 — $1799
(with MMX™ Technology)
Business lease: $63/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory /512KB Pipeline Burst Cache
- 4.3GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D w/4MB SGRAM
- Upgrade to Matrox Mystique 220 w/4MB SGRAM and Rainbow Runner for only $99
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-90 Speakers
- Quantex PC Health Monitoring & Support based on LDCM

QP5/166 M-2 (with MMX™ Technology).....$1599
QP5/200 M-2 (with MMX™ Technology).....$1699

QP6/233 M-3x — $1999
(featuring Pentium® II Processor)
Business lease: $70/Mo.

- 233MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 32MB SDRAM Memory /512KB Secondary Cache
- 4.3GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-45 Speakers with subwoofer
- Duantex PC Health Monitoring & Support based on LDCM

QP6/266 M-3x (featuring Pentium® II Processor).....$2149
QP6/300 M-3x (featuring Pentium® II processor).....$2349

Software Bundle
■ Corel Office Suite ■ MS Money '97 ■ Compton's Interactive Encyclopedia ■ Compton's Interactive World Atlas ■ Key Master Maps ■ Body Works 6.0 ■ American Heritage Talking Dictionary ■ Amazon Trail II ■ Internet the City ■ Compton's Reference Collection ■ Dr. Solomons Anti-Virus ■ Windows 95 with MS Plus ■ One-month trial memberships to AOL, CompuServe and Prodigy

Power Multimedia Series

Standard Features ■ 2 Universal Serial Bus (USB) Ports ■ K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone ■ 24X Max EIDE CD-RDM Drive ■ Ensoniq 32-Bit Wavetable Sound Card ■ 104-Key Keyboard With MS IntelliMouse ■ MS Windows '95 With MS Plus ■ Power Multimedia Software Bundle (including MS Office '97 SBE) ■ 3-year limited warranty, 24-hr./7-day Tech Support ■ Duantex Tower Case

QP5/233 SM-1 — $1599
(with MMX™ Technology)
Business lease: $56/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Pipeline Burst Cache
- 3.2GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB
- 15" Digital Monitor (14.0" viewable)
- Altec Lansing ACS-90 Speakers
- Quantex PC Health Monitoring & Support based on LDCM

QP5/200 SM-1 (with MMX™ Technology).....$1499
QP6/233 SM-1x (featuring Pentium® II processor) $1799
QP6/266 SM-1x (featuring Pentium® II processor) $1899

QP6/233 SM-2x — $2049
(featuring Pentium® II processor)
Business lease: $72/Mo.

- 233MHz Pentium® II Processor
- 32MB EDO Memory / 512KB Secondary Cache
- 4.3GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D with 4MB
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-90 Speakers
- Quantex PC Health Monitoring & Support based on LDCM
- Upgrade SM-2 to 64MB EDO RAM and 5.1GB HD for only $150

QP5/200 SM-2 (with MMX™ Technology).....$1749
QP5/233 SM-2 (with MMX™ Technology).....$1849
QP6/266 SM-2x (featuring Pentium® II processor) $2149

QP6/266 SM-3x — $2349
(featuring Pentium® II processor)
Business lease: $82/Mo.

- 266MHz Pentium® II Processor
- Intel 440LX PCI Chipset
- 32MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- Upgrade to AGP Millennium II 3D w/4MB WRAM for only $49
- 17" Digital Monitor (16.1" viewable)
- Altec Lansing ACS-45 Speakers w/subwoofer
- Quantex PC Health Monitoring & Support based on LDCM

QP6/233 SM-3x (featuring Pentium II processor) $2199
QP6/300 SM-3x (featuring Pentium II processor) $2549

Software Bundle
■ MS Office '97 SBE ■ MS Money '97 ■ Office Mate ■ Day Planner Pro ■ Power Business Plans ■ Form Designer Pro ■ Project Manager Pro ■ Labels Unlimited ■ Compton's Reference Collection ■ Dr. Solomons Anti-Virus ■ Windows 95 with MS Plus ■ One-month trial memberships to AOL, CompuServe and Prodigy

Upgrade (available with system purchase)
■ Panasonic PD/CD-Rom Drive w/ one 650MB PD cartridge $ 249 ■ Three(3) Panasonic PD Cartridges $99 ■ Microsoft Natural Keyboard (upgrade from 104-keyboard). $ 39 ■ HP Deskjet 692C Printer (w/photo color kit)....$ 299 ■ HP Laserjet 6L Laser Printer....$ 399

The notebook that has absolutely everything is getting high fives from absolutely everyone.

MMX™ intel inside pentium® PROCESSOR

Spectacular Reaction

C-Net Snapshot "Buy It" (09/17/97)

"Quantex makes an impressive debut in the laptop market with a value-priced portable that offers great features and performance."

"...users should definitely give the Quantex H-Series 1330 and the value it offers a serious look. We did, and that's why it gets a Buy It."

PC Magazine "Honorable Mention" (10/07/97)

"...a great choice if you want a 233MHz (Pentium® processor with MMX™ technology) notebook but don't want to break the bank in the process"

Windows Sources "Power User's Bargain" (11/97)

"All in all, Quantex's H-Series is an excellent entry into the power-user segment of the notebook market...it offers the best deal we've seen on a 13.3-inch XGA screen."

Quantex H-Series Notebooks do not include LDCM support

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Quantex H Series

Standard Features ■ 3.5" 1.44 Modular Floppy Drive ■ 20X Max Modular CD-ROM Drive ■ PCI Bus w/128-bit graphics accelerator ■ Integrated 16-bit Stereo Sound and Speakers ■ Touchpad ■ Smart Lithium Ion Battery ■ USB and Fast IR Ports ■ PCMCIA K56flex protocol Fax/Modem ■ Windows 95 ■ Carrying Case

Quantex H 1211 $3299

Business lease: $107/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.) Architecture
- 12.1" SVGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 2GB HD
- 3-year limited warranty on CPU and Main Memory
- 1-Year parts and labor limited warranty on all other components

Quantex H 1330 $3899

Business lease: $127/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.) Architecture
- 13.3" XGA Active Matrix Display
- 32MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 3GB HD
- 3-year limited warranty on CPU and Main Memory
- 1-Year parts and labor limited warranty on all other components

Quantex H 1331 $4299

Business lease: $140/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- Intel Mobile Module (I.M.M.) Architecture
- 13.3" XGA Active Matrix Display
- 64MB SDRAM (expandable to 144MB)/512KB Pipelined Burst Cache
- 4GB HD
- 3-year limited warranty on CPU and Main Memory
- 1-Year parts and labor limited warranty on all other components

OPTIONS ■ Mini-Docking Station....$199 ■ 2nd Lithium Ion Battery....$199 ■ PCMCIA Network Adapter....$129 ■ Deluxe Carrying Case....$99

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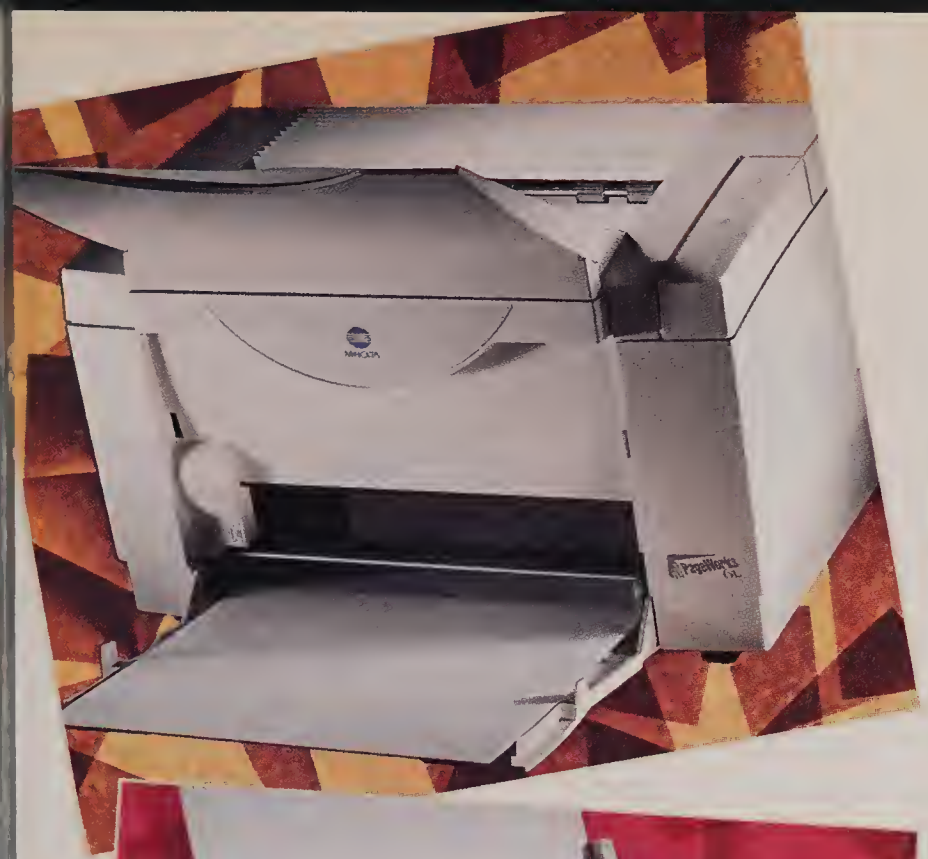
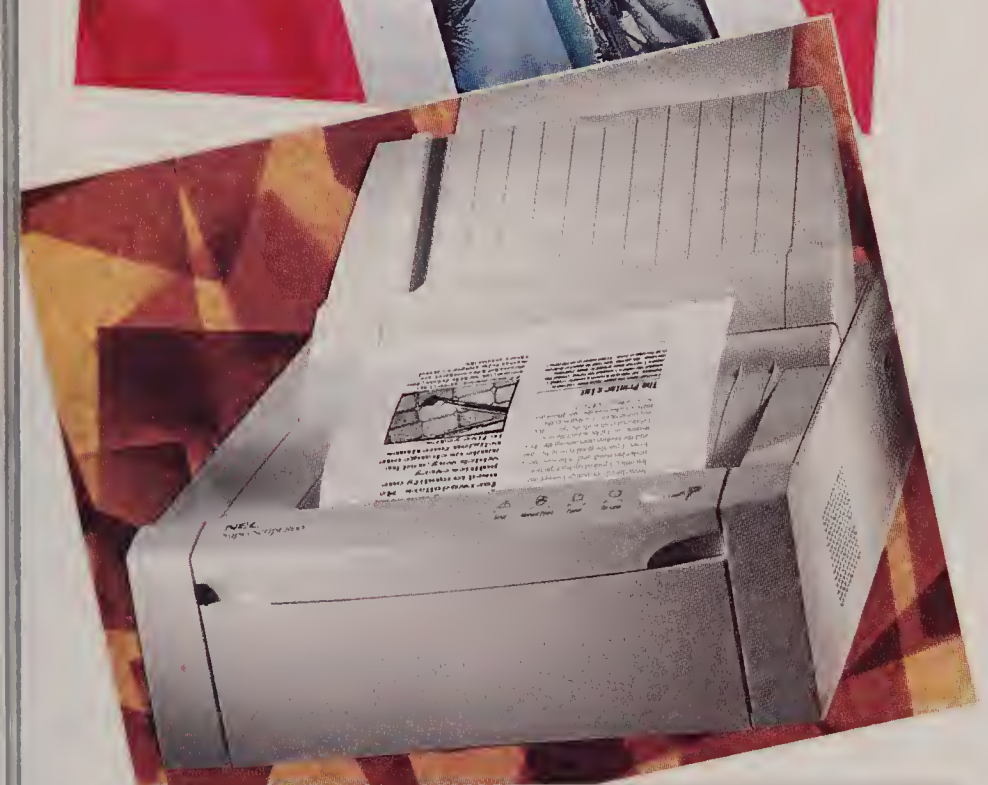
Text, Graphics, and... Photos?

Photo-quality printers for $199? **Get real**—this year's top personal printers can **crank out** sharp text and dazzling color, but **don't ditch** your local Fotomat yet.

BY DAN LITTMAN





This Month's Best Buys

The tiny Minolta PageWorks 6L (top) is a good general-purpose monochrome laser. The Canon BJC-4300 (center) produces close-to-realistic photos for a remarkably low price. And the NEC SuperScript 860 (bottom) is the fastest printer here.

HARDWARE BUYS

NEED A NEW print for your living room wall? Want to add a photo of your new office to the quarterly report? Easy, say all the personal printer companies. Just fire up your PC and print it out on your $300 ink jet.

That's the talk. But can the new color ink jets walk the walk when it comes to producing photo-quality images? No doubt about it, all the images that printer companies show in their ads look terrific—they're as smooth, colorful, and detailed as a 35mm snapshot. But based on our tests of 14 color ink jets, photo-realism is a ▶

PHOTOGRAPHS BY ROBERT CARDIN

little, uh, unrealistic. You can get close: We got striking prints using glossy paper, vendor-suggested settings, and, often, special ink. But photo-realism comes at a price—you have to buy costly paper, tweak settings, and start with very high-quality images. The HP DeskJet 694C and Canon BJC-4300 did best with a photo digitized on a 1200-dpi drum scanner, which few people have lying around. But even those images didn't quite match photos.

As alluringly cool as photo-quality printing is, the typical personal printer tackles more mundane chores: text documents, spreadsheets, simple presentations, and fun stuff like fancy cards. But picking one is tough—especially a color ink jet printer—because of the vast array of choices. We tested five color ink jets from Hewlett-Packard alone. Of the others, Canon's BJC-4300 is a Best Buy for a second month. It produces nice color documents, including photos; is easy to use and nicely designed; and costs only $199. (It looks like this low price won't dazzle us for long—NEC's SuperScript 150C will run you an amazingly low $119, though it comes too late for this issue.)

According to our reader surveys, people buy fewer monochrome personal printers than color, but mono is still important—especially for business use. We tested nine models and picked Minolta's new PageWorks 6L and the NEC SuperScript 860 as the best values. The PageWorks 6L did not excel in any one area, but was above average in all and costs $299—pretty low for a personal laser printer. The $399 NEC SuperScript 860 costs $100 more, but it prints text at a swift 7 pages per minute, faster than any other personal laser we've tested.

This Month's TOP 10 in Brief

These personal printers made our Top 10 chart this month. For the complete chart, see page 337.

COLOR PRINTERS

1. Canon BJC-4300*
2. Epson Stylus Color 800
3. Canon BJC-7000
4. HP DeskJet 722C
5. HP DeskJet 694C

MONOCHROME PRINTERS

1. Minolta PageWorks 6L*
2. NEC SuperScript 860*
3. HP LaserJet 6Lse
4. NEC SuperScript 660plus
5. Panasonic KX-P6500

* Best Buy

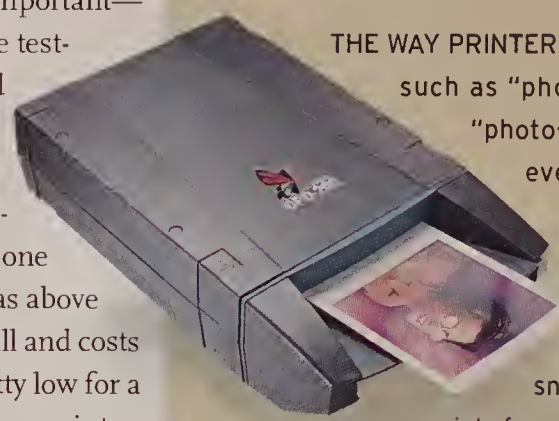
PHOTO FINISH

AS WE BEGAN our research for this review, several leading ink jet printer vendors came by to show their new "photo-quality" printers. Their output samples were stunning. To see if we could match them, we added three new image files to our test prints: a picture of a mural, taken with a 75-dpi digital camera; a 600-dpi Corel Photo CD image of a beach; and a picture of a woman's face, digitized on a scanner.

The old adage "garbage in, garbage out" applies to photo-quality printing. The ink jets managed colorful and fairly detailed prints of the mural, but they were nowhere near as sharp as a 35mm photo. The higher-dpi beach scene was better, but also lost details and seemed slightly out of focus.

The best images came from our drum-scanned head shot. Most printers did more than a serviceable job here. The

Photo Printers



Aztech's Desktop Photo Developer DPD-200

THE WAY PRINTER ADS use phrases such as "photo quality" and "photo-realism," nearly every color printer should produce photos that are indistinguishable from a real snapshot. But even prints from the best general-purpose models, such as Canon's BJC-4300, are obviously computer-generated. Colors are made up of tiny dots, and outlines look a bit jagged.

GETTING THE BEST PRINTS

IF YOU CRAVE quality that's closer to true photo-realism, consider a model designed for the purpose. You have to be serious to justify the cost: Photo printers run from $299 to $499, and a single image can cost up to $2.50 to produce, including ink and photographic-style paper. You'll probably still need a general-purpose printer; of the models here, only Epson's Stylus Photo also does plain-paper text documents.

At best, photo printers produce output that

COLOR PRINTERS — FEATURES COMPARISON

	MODELS	Street price (9/1/97)	FEATURES: Printer type	True monochrome resolution (dpi)	Enhanced resolution (dpi)	True color resolution (dpi)	Enhanced resolution (dpi)	Windows 95-certified Plug and Play	PAPER: Largest size	Input capacity (sheets)
1	Canon BJC-4300	$199	ink jet	720 x 360	n/a	360 x 360	n/a	●	banner	100
2	Epson Stylus Color 800	$399	ink jet	1440 x 720	n/a	1440 x 720	n/a	●	banner	100
3	Canon BJC-7000	$449	ink jet	1200 x 600	n/a	1200 x 600	n/a	●	legal	130
4	HP DeskJet 722C	$349	ink jet	600 x 600	600 x 600	[1]	[1]	●	banner	100
5	HP DeskJet 694C	$299	ink jet	600 x 600	600 x 600	600 x 600	600 x 300	●	banner	100

Best Buy Also see Top 10 chart, page 337. ● Yes ○ No n/a = not applicable

[1] Hewlett-Packard does not release color resolution for this model. [2] Manual-feed slot for envelopes only.

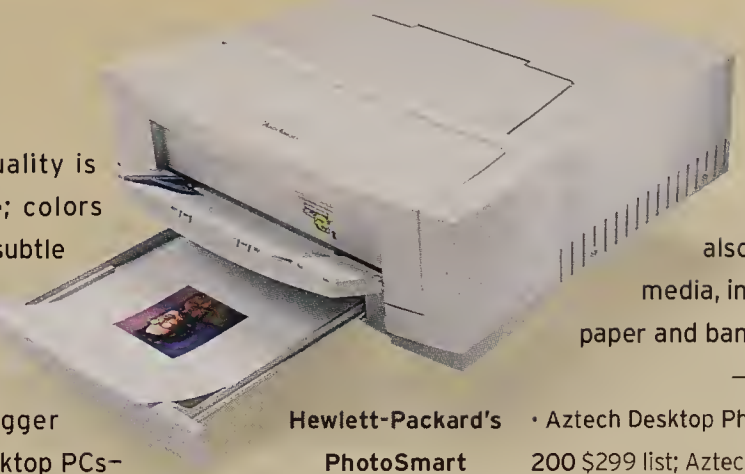
Super Quality, Steep Prices

does look like photographs, but they need high-quality image files (24-bit color and at least 300-dpi resolution). If you start out with a low-res, highly compressed image, such as those produced by inexpensive digital cameras, a photo printer may *accentuate* a picture's deficiencies.

Among the newest and least expensive photo printers are Aztech's Desktop Photo Developer DPD-200 and Eiger Labs' EigerMedia Photo Lab, nearly identical models that sell for $299. Each is about shoe box size and includes a pass-through connector so it can share a parallel port with your main printer. Oddly, these printers don't use ink; instead, they expose dyes embedded in 4-by-5-inch sheets of glossy paper, which cost 50 cents apiece. The process worked well with high-resolution image files, but low-res files tended to be jaggy-looking. Maximum print size is 3 by 5 inches—very small if you want to reproduce a prized photo for framing.

BEYOND BIG

UNLIKE THE Aztech and Eiger models, Hewlett-Packard's $499 PhotoSmart Photo Printer can print on 8.5-by-11-inch paper that looks and feels like real photo-finishing stock. (A full-page photo costs around $2.50.) The PhotoSmart's reproduction quality is the best here; colors look rich, and subtle details are sharp. However, this printer is huge—bigger than many desktop PCs—and loading paper into its cavernous innards is like sliding a pizza into a brick oven. Photos can take 15 minutes to dry.



Hewlett-Packard's PhotoSmart Photo Printer

Epson's $499 Stylus Photo doesn't equal the PhotoSmart's quality—skin tones look less realistic, for example—but it's easier to live with. Small as a typical color ink jet, it's the one photo printer here that also produces black text on plain paper (albeit slowly). Photos look best on Epson's glossy paper (an 8.5-by-11-inch image costs about $2), but the Stylus can also handle many other media, including cheap ink jet paper and banner-size sheets.

—Harry McCracken

- Aztech Desktop Photo Developer DPD-200 $299 list; Aztech Labs; 510/623-8988; www.aztech.com

READER SERVICE NO. 733

- EigerMedia Photo Lab $299 list; Eiger Labs; 800/653-4437; www.eigerlabs.com

READER SERVICE NO. 734

- Epson Stylus Photo $499 list; Epson; 800/463-7766; www.epson.com
- Hewlett-Packard PhotoSmart Photo Printer $499 list; Hewlett-Packard; 800/752-0900; www.hp.com

READER SERVICE NO. 735

Fresh Photos, Fine Details

TRUE TO advertising claims, photo-realistic printers produce fabulous results—but the per-print costs are steep.

The $499 PhotoSmart, our favorite among the photo printers, offers crisp details.

The $449 general-purpose BJC-7000 did pretty well, but photos lose detail and look a bit gritty.

Canon BJC-4300 and HP DeskJet 694C prints looked the best, with smooth (if pale) colors, even transitions from bright to shadow, and sharp texture detail. The Epson Stylus Color 800 also did well except for banding in solid colors. Only the HP DeskJet 722C and the BJC-250, Canon's least expensive ink jet (which missed the chart), produced noticeably poorer images.

The gotchas? The paper you need costs a lot more than 5-cent ink jet paper—up to $1 a sheet. These photo papers are heavy and stiff; they're better for documents to frame or tack up. Some printers, like Canon's BJC-4300, also use special inks, adding to the cost. And with the high-quality electronic images needed to get the best prints, ▶

		PRINTING COSTS						SUPPORT			
Envelope capacity	Manual-feed slot	Estimated cost per plain-text page	List price of black cartridge	Estimated black cartridge life (pages)	Estimated cost per color page	List price of color cartridge	Estimated color cartridge life (pages)	Warranty (years)	Toll-free phone support	Weekday support (hours)	Weekend support
15	●	$.04	$7.40	200	$.14	$28.40	200	1	●	24	●
10	○	$.03	$27.26	900	$.09	$27.26	300	2	●	12	○
15	●	$.04	$37.50	900	$.03	$20	640	1	●	24	●
15	●	$.03	$32.95	840	$.09	$39.95	422	1	○	16	●
20	●[2]	$.04	$32.95	650	$.10	$34.95	313	1	○	16	●

you'll have *huge* files—10MB to 20MB each, based on the size, resolution, and color depth of the image. Here, 36 shots is not a roll of film, it's 300MB or more of disk space. For more on photo-quality printing, see "Photo Printers: Super Quality, Steep Prices."

MONOCHROME HANGS ON

IN THE EVOLUTIONARY TREE of printers, personal lasers may not be headed for extinction, but they're out on a dying limb. Though their text speed has increased over 10 percent and graphics almost 50 compared to a year ago, their print quality hasn't changed much. Where color ink jets have the life span of fruit flies, some mono lasers we've seen have been around for over a year; we first tested the Panasonic KX-P6500 in February 1996.

What keeps personal lasers alive despite stiff competition from color ink jets? ▶

Good Prints for Nice Prices

From Canon, Epson, and HP

COLOR PRINTERS: Photos

1 Canon BJC-4300 The BJC-4300 offers clear edges and smooth transitions, but its photo colors are washed out.

2 Epson Stylus Color 800 We found the 800's colors to be fairly accurate, but banding was a problem.

3 Canon BJC-7000 Though its photos are a bit dark, the BJC-7000 produces stronger color than its fellow Canon.

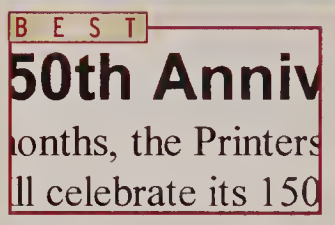
4 HP DeskJet 722C Dark colors and overall fuzziness leave us unimpressed with the 722C's photo capabilities.

5 HP DeskJet 694C The 694C prints a vivid photographic image with crisp edges, fine detail, and lifelike colors.

COLOR PRINTERS: The Real Thing

At left is the original image from our photo test. We expected our color printers to reproduce the photograph's sharp detail, lifelike flesh tones, and smooth color gradations. As you can see from the results above, a few printers came close, but none hit the mark exactly.

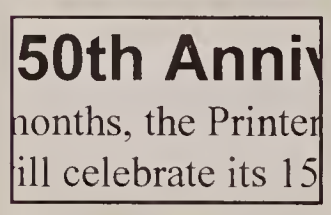
COLOR PRINTERS: Text



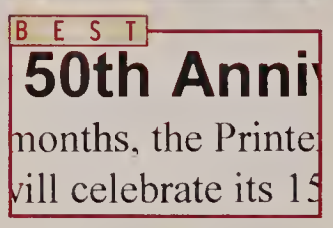
4 HP DeskJet 722C The 722C offers clean text edges, even weights, and a dark black.

2 Epson Stylus Color 800 Fuzzy text with jagged edges is the 800's unfortunate hallmark.

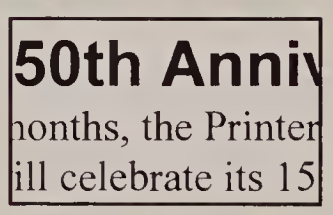
MONOCHROME PRINTERS: Gray Scale and Text



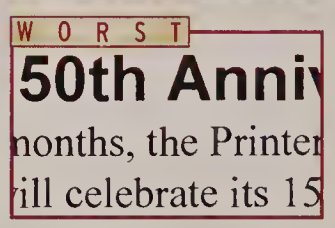
1 Minolta PageWorks 6L While its gray scale is pretty good—a bit dark and fuzzy, but acceptable—the Minolta's text is admirable, with jag-free edges.



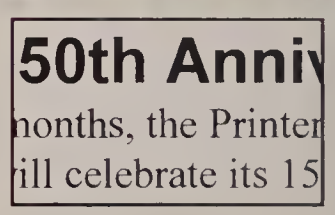
2 NEC SuperScript 860 The NEC's text is as sharp as the Minolta's but with finer letters, and its gray scale shows good transitions but is spotty.



3 HP LaserJet 6Lse Solid text and fairly smooth (if slightly weak) grays make the LaserJet 6Lse a fine choice for overall print quality.



4 NEC SuperScript 660plus Though the 660plus does well on text, its gray scales, even darker than the Minolta's, are barely acceptable.



5 Panasonic KX-P6500 This tiny printer produces clean, sharp text but awful gray scales. That high-contrast look is particularly unappealing.

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Lower prices. In the last six months, the average laser price has sunk over $100—from $449 to $341. The KX-P6500 went from $449 to $349. None of this month's lasers is over $400; the Mita DP-560 (which missed the chart) is only $199. At that price, you can almost afford to buy both a laser *and* a color ink jet printer.

Lasers still do some things better than ink jets. They're faster, they print on different papers (like textured sheets), and over the long run their consumables cost about half. But most people buy a laser to give documents a more businesslike look—the impression to convey when you're making proposals or negotiating with the IRS.

NEED SPEED? GET A LASER

LASERS HOLD AN EDGE in raw print speed. Printing monochrome text pages, our lasers averaged twice the ink jets' speed—5.3 pages per minute versus 2.7. The fastest was NEC's SuperScript 860 at a quick 7 ppm. If you need color but mostly print text, our fastest ink jets were the Apple Stylewriter 6500 and the HP 890Cse; both hit nearly 5 ppm, but neither made the chart due to relatively high costs and middling features and support. Which was slowest? Epson's Stylus Color 400, also a chart misser, at just 1.1 ppm.

The lasers were faster with graphics, but it's not a fair comparison. Color printers deliver up to four inks to the lasers' one for each dot on a page. Among most of the lasers, there was minimal difference in graphics speed—3.2 ppm to 3.6 ppm. The HP LaserJet 6Lse hit only 2 ppm.

If you need to print business graphics in color, the Epson Stylus Color 800 and Stylus Color 600 (which missed the chart) are the fastest. The Stylus Color 800 is rated at twice the color speed of competing ink jets (7 ppm versus next-fastest 3.5 ppm) and it shows; it was first to print Excel charts, an HTML page, and a five-page presentation. It finished our CorelDraw color photo in 44 seconds, 27 seconds faster than the Stylus Color 600. This is especially impressive given that our other ink jets took over 2.5 minutes. (A high-quality photo can take over 15 minutes to print—if you're using the best-quality settings.)

PRINTERS FOR SPECIAL NEEDS

MOST PRINTERS we tested are for general personal and small-office business use. They're fairly comparable in size, weight, and paper size capacity. But a couple don't fit the standard mold. The HP DeskJet 1000Cse, for example, is the best choice for printing really big documents. It's similar to the HP DeskJet 820Cse (now replaced by the DeskJet 722C), which can take paper up to 13 by 19 inches. With that size paper, you can print your own color posters. At $499, it's only $50 more than the 890Cse, which didn't make the chart.

If you travel and want to take a color ink jet printer with you, we recommend the $149 Canon BJC-250. Although not specifically designed for portability, it's small and light—only 6.8 by 8.5 inches in size and 5.5 pounds. ▶

TOP 10 PERSONAL PRINTERS

TEST REPORT

HOW WE TEST All printers are tested in default mode under Windows 95 using a Gateway 2000 PMMX-166 with 32MB of RAM. Tests are timed from the point when the print command is issued until the last sheet is out of the printer. Test documents include ten pages of plain text and a two-page newsletter created using Word 7.0 for Windows 95; a five-page plain spreadsheet and a two-page spreadsheet with a color pie chart created using Excel 7.0 for Windows 95; the contents of an HTML page from a Web site; a five-page color presentation created in Freelance 7.0; and a color photograph with colored text created in CorelDraw 7.0. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

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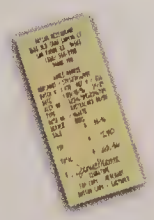

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Canon BJC-4300

STREET PRICE: $199
PRINT QUALITY: Good color (although not the best), adequate text and gray scale, poor line art
EASE OF USE: Good
TESTED PRINT SPEED: 2 ppm text, 0.3 ppm graphics

Despite the arrival of numerous color printers since the BJC-4300 first topped our chart in October, it still leads the pack, in large part due to its astoundingly low price and easy operation. Predefined driver settings and good documentation make this printer especially easy to use. Performance is weak: Though a tenth of a page faster than in previous tests, it's still twice as slow with text as some ink jets. (Graphics speed is average.)

At a mere $199, the Canon BJC-4300 is the least expensive printer on our Top 10 chart—color or monochrome. It also comes with helpful software features that might improve output. Settings for photos, graphics, and other document types are predefined. If you modify these settings, a setup analyzer validates your new arrangement. If you've chosen invalid settings, it displays a dialog box showing what's wrong and allowing you to correct settings or override. You can also customize and save configurations.

Though the BJC-4300 didn't offer the best photo-realistic output (that honor goes to the HP DeskJet 694C, in fifth place), it came close. It printed our photo with a slightly washed-out look, but the image's edges were clear and its colors smooth. In our other tests, the printer's gray scale was fairly subtle. Text appeared somewhat fuzzy, but shadow- and spatter-free. As with many ink jets, lines are its Achilles' heel—they varied greatly in weight.

We liked the BJC-4300's bundled software: Canon Creative 3 for photo editing and greeting cards, and Web Solutions. A topflight manual explains how to get the best results from the driver and a variety of media, such as fabric, T-shirt transfers, glossy photo paper, banners, and specialty inks. One other perk: With the easily installed IS-22 part ($99 extra), you can turn this printer into a 24-bit color scanner. *Canon Computer Systems; 800/848-4123; www.ccsi.canon.com*

READER SERVICE NO. 728

2 Epson Stylus Color 800

3 Canon BJC-7000

4 HP DeskJet 722C

5 HP DeskJet 694C

Epson Stylus Color 800

STREET PRICE: $399
PRINT QUALITY: Good color, adequate text and line art, poor gray scale
EASE OF USE: Adequate
TESTED PRINT SPEED: 3.8 ppm text, 1.1 ppm graphics

Now $50 cheaper since its last appearance on our chart (in June), Epson's Stylus Color 800 rose to second place this month. Though still the second most expensive model here, it's a fine printer to share with others.

Unlike most personal printers, the 800 is workgroup-friendly: It supports an ethernet card ($399) and PostScript ($99 more) for heavy graphics use. It also has a Mac serial port, allowing work with both platforms.

The 800 produces vivid, attractive color, even on plain paper. We also liked it in our photo test, though banding spoiled one otherwise nice image. The 800's text can be fuzzy on plain paper, and gray scale is harsh compared to that of the other color printers on our chart.

Though a slow workgroup printer, it's very fast for a one-person machine. On text, it's over half again as fast as any other but HP's new DeskJet 722C, our number four. At graphics, it's over three times as fast as any other color printer, save Epson's Stylus Color 600. However, with no manual-feed slot, you must empty the tray to print envelopes.

The Stylus Color 800 comes with an extraordinary two-year warranty. Though its support hours are the shortest (only 12 on weekdays), Epson offers phone support for five years after the product has been discontinued—unlike HP, for example, which offers only 90 days. *Epson America; 800/463-7766; www.epson.com*

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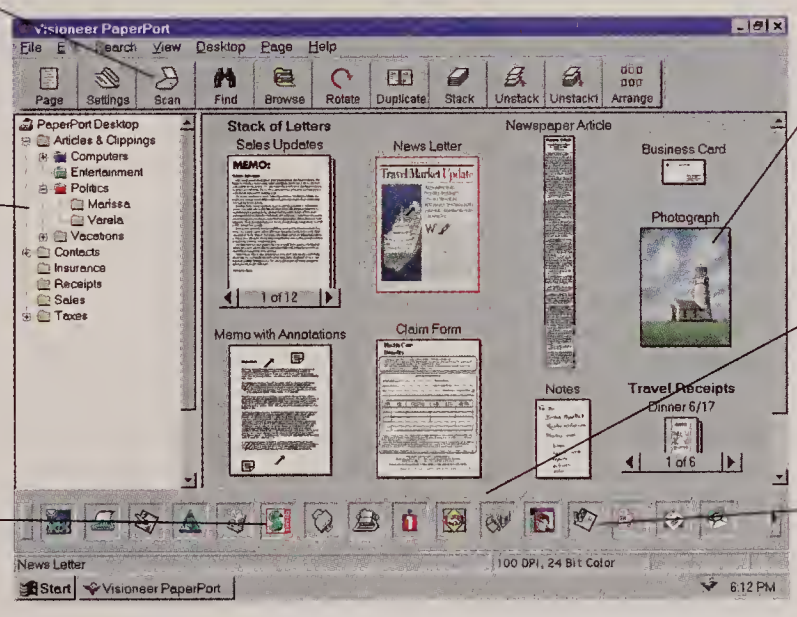

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Canon BJC-7000

3

STREET PRICE: $449

PRINT QUALITY: Good color, text, and gray scale; adequate line art

EASE OF USE: Very good

TESTED PRINT SPEED: 2.3 ppm text, 0.3 ppm graphics

Despite being $50 more than the next most expensive printer on the chart, this top-of-the-line personal ink jet makes its Top 10 debut this month thanks to fine output and top-notch documentation.

As Canon's high-end personal printer, the BJC-7000 comes with some extra features its siblings, the BJC-250 and BJC-4300, don't. It's capable of a higher maximum resolution (1200 by 600 dpi). It also includes a case for the resting ink cartridge, which attaches handily to the back of the printer. Besides having preconfigured settings for photos, graphics, and transparencies like the other Canon printers', the BJC-7000's driver gives users control over cyan, magenta, yellow, and black settings, plus brightness and intensity. We liked the flexibility but found the labyrinthine interface—full of tabs, buttons, and more tabs—confusing.

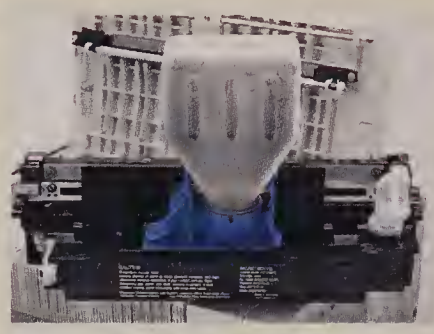
An intriguing difference is the 7000's black-cartridge design. Intended to produce coated-paper results on plain paper, the cartridge has an extra tank full of a clear sealant that preps the paper before the ink sprays. This potential selling point—most ink jets do poorly on plain paper—is not quite successful. The BJC-7000's black text on plain paper looks better than most ink jets', but color and gray scales show little improvement over normal ink jets'—they're still a bit faded and blurry. On coated ink jet paper, however, the BJC-7000 renders flesh tones, earth tones, and other difficult colors with subtlety. It even does okay with narrow lines, while other printers improve little on ink jet paper.

The BJC-7000 includes the same nice CD-ROM bundle as other Canons. Its manual offers strong troubleshooting. But changing ink cartridges can be tricky, and the unit is loud, even when idle. Also, its output tray is a floppy plastic plate that needs to rest on a desk. *Canon Computer Systems; 800/848-4123; www.ccsi.canon.com*

READER SERVICE NO. 729

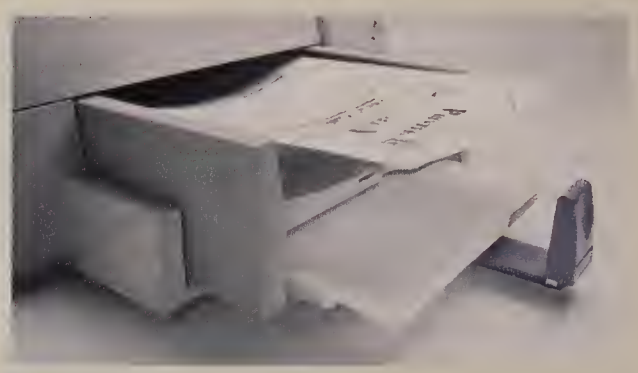
Highlights BEST AND WORST

AN UNEXPECTEDLY HANDY feature can add real value to a printer purchase, while one bad component can take the shine off an otherwise good product. Here's a selection of our most-loved and least-liked features culled from our hands-on testing.



GREEN CONSUMABLES

The toner for most laser printers comes in a large, enclosed case of heavy plastic—when the toner's gone, the cartridge goes in the trash. With Panasonic's KX-P6500, you can cut down on plastic waste by refilling the toner cartridge from a lightweight plastic bottle.



SMART PAPER HANDLING

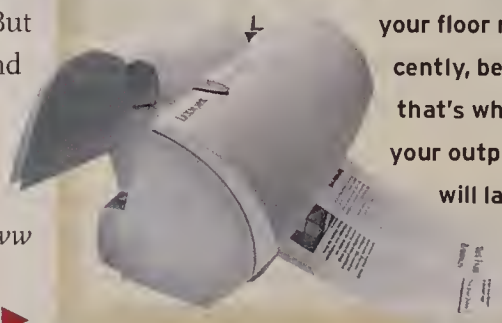
The triple-decker paper tray on HP's midrange printers, including the DeskJet 890Cse and DeskJet 694C, holds hefty stacks of fresh paper and finished prints. It's easy to set up, doesn't cover much desk space, and has a drying rack that separates freshly completed prints from the pile so that pages don't smear or stick together.

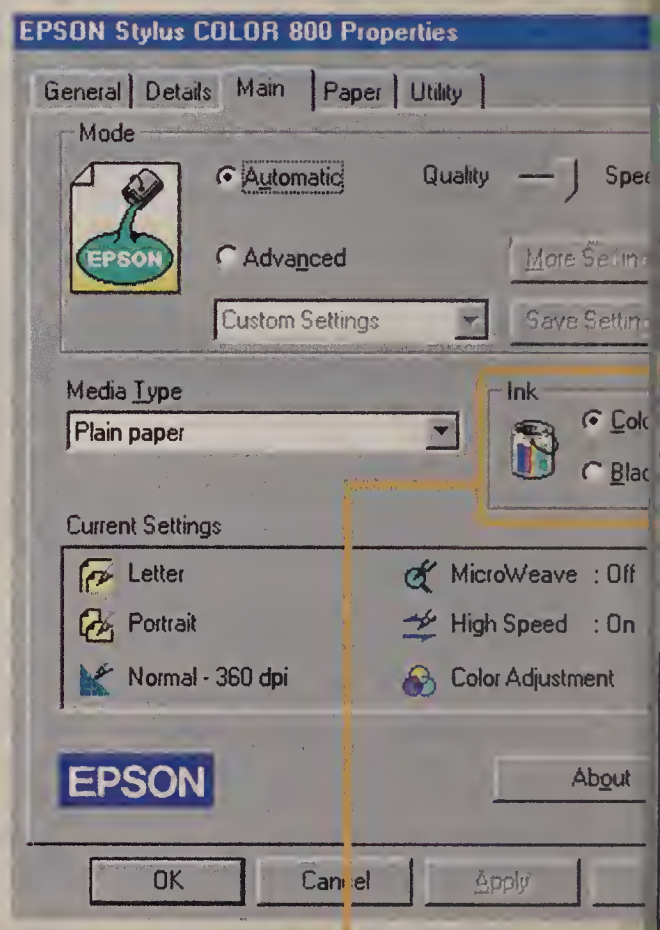
BACK IN (COMPOSITE) BLACK

A few months ago we thought we'd seen the last of printers that fake black by mixing other colors. Now they're back: The Canon BJC-250, Lexmark 1000 Color Jetprinter, and HP DeskJet 400L (not reviewed here) are all cheapies that can't hold black and color cartridges at the same time.

FLOOR SAMPLES

To save money, Lexmark eliminated the output tray on its 1000 model. Let's hope you've cleaned your floor recently, because that's where your output will land.





BLACK ON DEMAND

If you use the default settings on the Epson Stylus Color 800, the printer will automatically deliver composite black, even with two cartridges installed. To get true black, you must choose the black setting manually in the driver before you print, an extra step.

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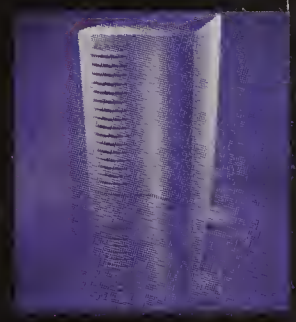

With the power of up to six Pentium® Pro chips and room for over 108-GB of storage, the ALR Revolution 6X6 is arguably the most advanced business server in the world. Redundant power supplies and ActiveCPR autorecovery technology make this an ideal platform for 7/24 environments.

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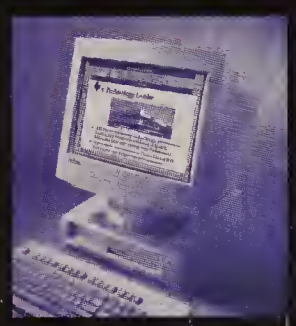

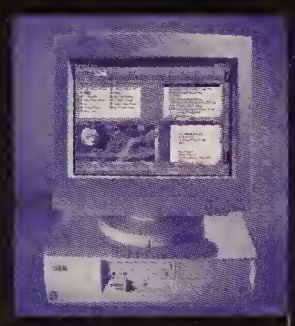

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Circle 9 on reader service card

HP DeskJet 722C

STREET PRICE: $349
PRINT QUALITY: Good color, text, and line art; very good gray scale
EASE OF USE: Very good
TESTED PRINT SPEED: 4.1 ppm text, 0.3 ppm graphics

The only brand-new printer to make our color chart this month, the HP DeskJet 722C is a good choice if time is of the essence: It spits out text-only pages almost as fast as a monochrome laser. There's a lot more to like about this ink jet. The DeskJet 722C's output is among the best we've seen. Text is free of jagged edges and looks almost as good on plain paper as on ink jet paper—not a boast many ink jets can make. Lines don't bulge or have bright spots, and graphics look smooth, with realistic colors and subtle details, despite a bit of HP's hallmark graininess. Gray-scale graphics are equally attractive. Photo prints are not exceptional, however—you could easily drop $14.99 on a 20-sheet package of HP's Deluxe Photo paper and you might still get mediocre photo prints. The DeskJet 722C's bundled CD-ROM is tempting; it includes Corel Print & Photo House Select and Streetwise Software's By Design, accompanied by a 32-page crash course on graphic design.

If you live and work in close quarters, this printer has one other plus: Instead of the typical ink jet clatter, it makes only a quiet whooshing noise that won't interfere with business on the phone. It's also very sophisticated-looking: a calm, two-tone gray with a few smoky teal highlights.

Unfortunately, the DeskJet 722C's manual doesn't meet the high standards of most recent HP printer documentation. It's somewhat disorganized, and its illustrations lack the crystal clarity that we're used to. It covers the territory, but you may have to search for what you need. And with a midlevel price and mediocre support policies (no toll-free technical support, no Web e-mail support), the DeskJet 722C didn't earn a higher spot on our chart. *Hewlett-Packard; 800/752-0900; www.hp.com*

READER SERVICE NO. 730

HP DeskJet 694C

STREET PRICE: $299
PRINT QUALITY: Adequate color, line art, and gray scale
EASE OF USE: Very good
TESTED PRINT SPEED: 2.2 ppm text, 0.3 ppm graphics

HP's DeskJet 694C is a repackaged version of the venerable DeskJet 693C, one of the first printers to tout photo-quality printing; this model comes with HP's photo-ink kit, a $35 value that includes a whole assembly of ink, cartridges, and printheads. At $299, the 694C is the second-cheapest model on our chart, beaten only by the bargain-price $199 Canon BJC-4300, which is a smidgen slower. Only adequate print quality across the board keeps it in fifth place, but the DeskJet 694C's 2.2-ppm text-printing speed and 0.3-ppm graphics-printing speed nearly match those of our most expensive printer, the Canon BJC-7000. As for quality, the 694C does a middling job, with acceptable though grainy colors, straight but shadowy lines, and text that's just a bit fuzzy.

The DeskJet 694C's design includes some nice touches. For example, a manual-feed slot enables you to print an envelope without having to remove the paper stack from the main input tray—one of those conveniences that you don't appreciate until the first time you need it. On-screen help is easily accessible, and that's important because beyond the printed setup guide, all the documentation is on the CD-ROM.

The DeskJet 694C's software bundle includes Storm Technology's Easy Photo image editing software, which comes with a vast collection of photos, and Corel's Print House Select, a layout program with an extensive collection of Corel clip art, fonts, and stock photos. *Hewlett-Packard; 800/752-0900; www.hp.com*

READER SERVICE NO. 731

MONOCHROME PERSONAL PRINTERS

Minolta PageWorks 6L

STREET PRICE: $299
PRINT QUALITY: Good text, adequate gray scale and line art
EASE OF USE: Good
TESTED PRINT SPEED: 5.2 ppm text, 3.2 ppm graphics

After years of supplying laser printer components to other printer vendors such as Lexmark, Minolta has stepped out with its own line of personal monochrome machines. Its new PageWorks 6L, a low-cost laser, is a winner: It zooms to our top spot this month. The NEC SuperScript 660plus in fourth place is as cheap, but the PageWorks produces nicer output and has a better design.

The PageWorks 6L's text looks good overall. The printer also handles thin lines pretty well. Its gray-scale graphics are not bad for an inexpensive printer—a little dark and fuzzy, but pleasing enough.

Having only 256K of memory in your printer can cause problems with big print jobs, even for printers that rely on the host computer for processing, as the PageWorks 6L does. However, in our testing we encountered no hangs. The PageWorks is reasonably fast for a host-based printer, too.

The PageWorks 6L is fairly small, even for today's personal printers—with paper trays closed it can almost fit into a shoe box. Yet it's very sturdy, with a rugged case and substantial paper-handling trays. The paper input tray also includes a separate manual feed, which allows you to insert letterhead, envelopes, or other pieces of media without emptying the main paper supply. And if you need more capacity than the standard 150 sheets, Minolta sells a 250-sheet add-on tray for $169 that sits snugly under the printer. *Minolta; 888/264-6658; www.minoltaprinters.com*

READER SERVICE NO. 723

NEC SuperScript 860

STREET PRICE: $399
PRINT QUALITY: Excellent text, adequate gray scale and line art
EASE OF USE: Very good
TESTED PRINT SPEED: 7 ppm text, 3.4 ppm graphics

NEC's SuperScript 860 claims our other monochrome Best Buy this month, but for different reasons than the PageWorks 6L. At $399, the ▶

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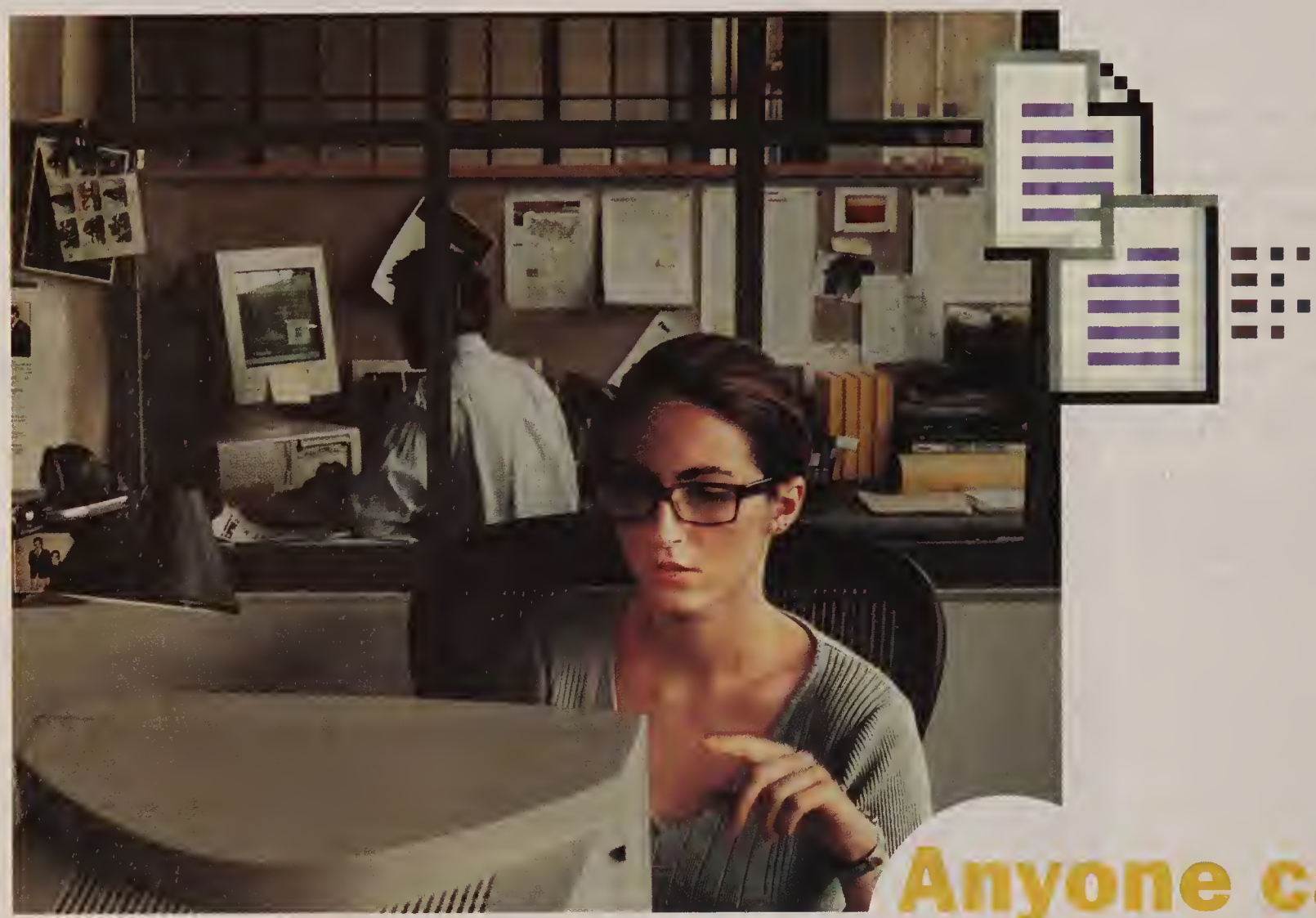

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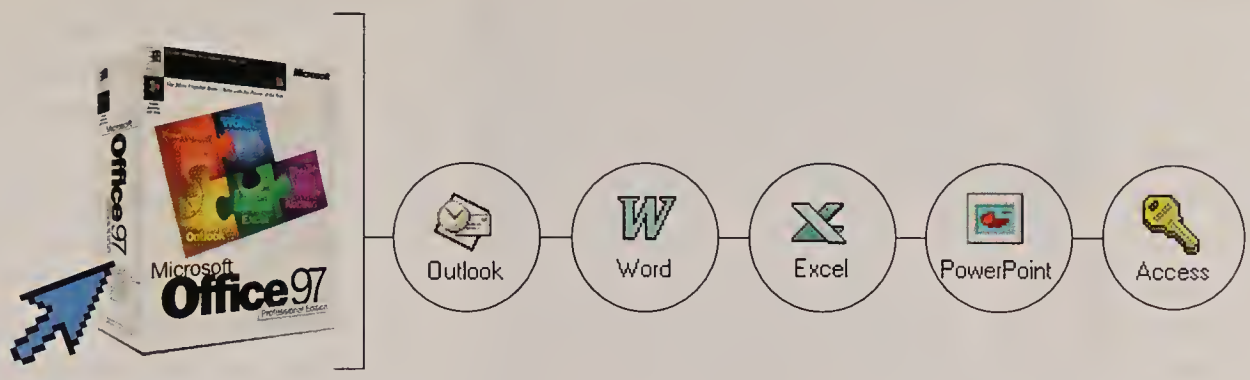

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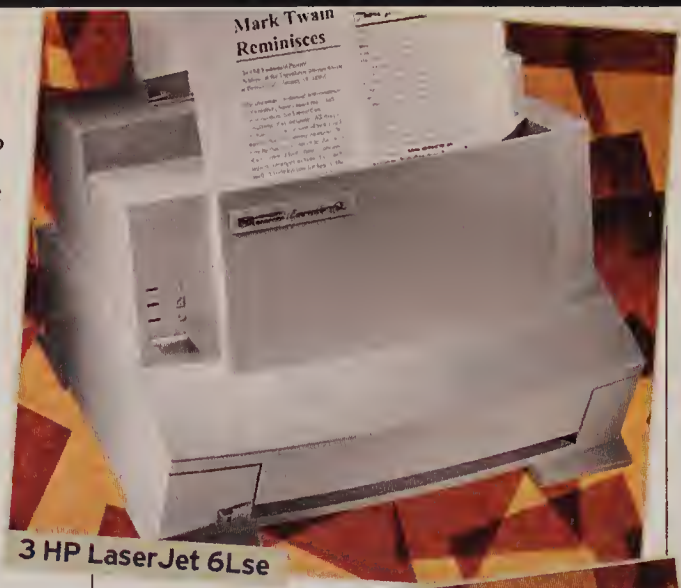
860 ties with the number three HP LaserJet 6Lse for highest price on the chart. But you get speed, sharp prints, and flexibility in return. The 860 is the fastest plain-text personal printer we've tested, over one page per minute quicker than the others. The 860 also produces terrific black text, similar to the Minolta PageWorks 6L's but cleaner and finer, crisp if somewhat uneven lines, and gray-scale graphics better than most personal monochrome printers'.

We found the 860 easy to use. Cartridges install well, and the printer's design is easy to figure out. We liked the many printing options, such as the ability to optimize prints for copying. The 860's manual is thorough, well indexed, and well illustrated. NEC offers toll-free phone support during the entire long two-year warranty (one year is average).

Our only gripes are with installation and page delivery. Installing the 860's driver software can be confusing: On one of our test beds, the executable file didn't know where on the CD-ROM to look for the installer, then had to disable drivers for other printers, and finally grilled us with multiple setup questions that Plug and Play should take care of automatically. Also, unlike most printers, the SuperScript 860 delivers pages face up, in reverse order. The software bundle isn't outstanding: Acrobat Reader, clip art, and Internet software. *NEC; 800/632-4636; www. nec.com*

READER SERVICE NO. 724



3 HP LaserJet 6Lse

4 NEC SuperScript 660plus

5 Panasonic KX-P6500

HP LaserJet 6Lse

STREET PRICE: $399

PRINT QUALITY: Excellent text, good gray scale and line art

EASE OF USE: Excellent

TESTED PRINT SPEED: 5.1 ppm text, 2 ppm graphics

The LaserJet 6Lse is the most expensive laser on our monochrome chart (tied with the number two NEC SuperScript 860) and the slowest, but it's a wise purchase if you need the best laser output possible for under $400. Its good-looking prints offer quality just a shade better than the NEC SuperScript 860's: clean, evenly weighted text with no jagged edges in sight; crisp, even lines; and distinctive shades of gray scale.

Despite its odd form—a squat, planar shape reminiscent of a neo-Bauhaus fountain—the 6Lse is a pleasure to use. If you need to change toner cartridges or clear paper jams, for example, its entire front half flops forward, offering wide-open access to the interior.

The printer's superb manual features a thorough index; clear, informative illustrations; and visual explanations of how to diagnose and fix print-quality problems and errors that pop up on the control panel, among other difficulties.

Other than its middling speed, the LaserJet 6Lse's only disappointment is its bundled software: It's all free or promotional stuff from Microsoft, with a net value of zero. *Hewlett-Packard; 800/752-0900; www.hp.com*

READER SERVICE NO. 725

MONOCHROME PRINTERS FEATURES COMPARISON

	MODELS	Street price (9/1/97)	FEATURES: Printer type	True monochrome resolution (dpi)	Enhanced resolution (dpi)	Windows 95-certified Plug and Play	PAPER: Largest size	Input capacity (sheets)	Envelope capacity	Manual-feed slot
1	Minolta PageWorks 6L	$299	laser	600 x 600	n/a	●	legal	150	15	●
2	NEC SuperScript 860	$399	laser	600 x 600	n/a	●	legal	200	5	●
3	HP LaserJet 6Lse	$399	laser	600 x 600	n/a	●	legal	100	10	○
4	NEC SuperScript 660plus	$299	laser	600 x 600	n/a	●	legal	150	5	●
5	Panasonic KX-P6500	$349	laser	1200 x 1200	2400 x 600	●	legal	100	10	○

Best Buy Also see Top 10 chart, page 337. ● Yes ○ No n/a = not applicable

NEC SuperScript 660plus

STREET PRICE: $299
PRINT QUALITY: Good text, poor gray scale, adequate line art
EASE OF USE: Adequate
TESTED PRINT SPEED: 5.2 ppm text, 3.3 ppm graphics

It appears that NEC tried to design the SuperScript 660plus to appeal to the same shoppers who would like Minolta's PageWorks 6L—people looking for a good all-around (if not perfect) laser at a low, low price. The two models cost the same and print at almost exactly the same overall speeds. But there the similarities end—the 660plus just isn't as good a deal. Most important, it falls down in print quality. Its text is all right, but the gray scale is very dark, and lines are somewhat indistinct.

We didn't care for the separate toner cartridge and imaging drum (most personal printers combine them). To install them we had to shove and jiggle them a lot, a common problem with two-part mechanisms. Even when the cartridge is installed properly, its handle might get trapped in the door if you're not careful. On the plus side, the imaging drum is designed to last as long as six or seven toner cartridges, unlike with most printers, where you have to throw out still-usable drums when cartridges run out. The printer's paper input tray holds 150 sheets, with an optional add-on 250-sheet tray for $169. The 660plus also deserves credit for catching prints facedown in an output tray—unlike NEC's SuperScript 860—so they're sorted correctly.

ONLINE

Beyond the TOP10

We also evaluated these personal printers, but they didn't score high enough to reach the Top 10. For write-ups, see PC World Online (www.pcworld.com/t10 printers).

MONOCHROME
- Brother HL-730 Plus
- Brother HL-760 Plus
- Minolta PageWorks 6e
- Mita DP-560

COLOR
- Apple Stylewriter 6500
- Canon BJC-250
- Epson Stylus Color 400
- Epson Stylus Color 600
- HP 890Cse
- HP DeskJet 672C
- HP DeskJet 1000Cse
- Lexmark 1000 Color Jetprinter
- Lexmark 7000 Color Jetprinter

The 660plus has additional problems, though. Except for its useful troubleshooting section, the printer's documentation is downright mediocre—it's badly indexed, confusingly illustrated, and awkwardly worded. Envelopes sent through the manual-feed guides came out looking so wrinkled, we wouldn't use them for anything but paying bills.

The SuperScript 660plus is very affordable and is fine as a text-only printer. But if a budget laser is what you're after, you'd be better off with the Minolta PageWorks. *NEC; 800/632-4636; www.nec.com*

READER SERVICE NO. 726

Panasonic KX-P6500

STREET PRICE: $349
PRINT QUALITY: Excellent text, poor gray scale, adequate line art
EASE OF USE: Adequate
TESTED PRINT SPEED: 5.7 ppm text, 3.6 ppm graphics

The first thing you'll notice about the KX-P6500 is its narrow tower shape—only 5 inches wide and 11 inches high, excluding its paper trays. The small footprint makes this laser perfect for squeezing onto cluttered desktops or into small offices. It's fairly fast, too. An old-timer among lasers—it first hit our monochrome chart in February 1996—it still prints graphics faster than any other personal printer we've tested, and with text it's second only to NEC's SuperScript 860.

Print quality is mostly what keeps this moderately expensive laser at the bottom of our monochrome chart. Though its text is crisp, the KX-P6500 makes a mess of graphics. Gray-scale images have a posterized look, as if someone cranked up the contrast so high only a few shades survived. Lines come out uneven. The printer could be easier to use, too. The on-screen status monitor displays a row of buttons with indecipherable icons—you'll need to keep the manual at hand to make sense of them. On the printer itself, the on/off button is located in an awkward place below a paper tray. As is becoming more common for monochrome personal printers, the KX-P6500 comes with not a whit of bundled software.

Fortunately, the KX-P6500's manual is strong; it covers the status monitor and everything else you'll want to know about using the printer. All Panasonic needs to do is update it—replace the Windows 3.1 screen shots with Windows 95 screens and redesign the whole thing for a less busy, crowded feel. *Panasonic; 800/742-8086; www.panasonic.com*

READER SERVICE NO. 727

Dan Littman is a freelance writer. Harry McCracken is senior writer for PC World. *Testing performed by Ulrike Diehlmann and Robert James of the PC World Test Center.*

For more information about all products in this article, circle reader service no. 908. ■

PRINTING COSTS			SUPPORT			
Estimated cost per plain-text page	List price of toner cartridge	Estimated cartridge life (pages)	Warranty (years)	Toll-free phone support	Weekday support (hours)	Weekend support
$.02	$74	3000	1	○	24	●
$.02	$99	5000	2	●	12	○
$.03	$85	2500	1	○	16	●
$.02	$69	3000	2	●	12	○
$.02	$34.95	2000	1	●	10	○

EVERY RELIGION HAS ITS CHURCH. FOR MICROSOFT

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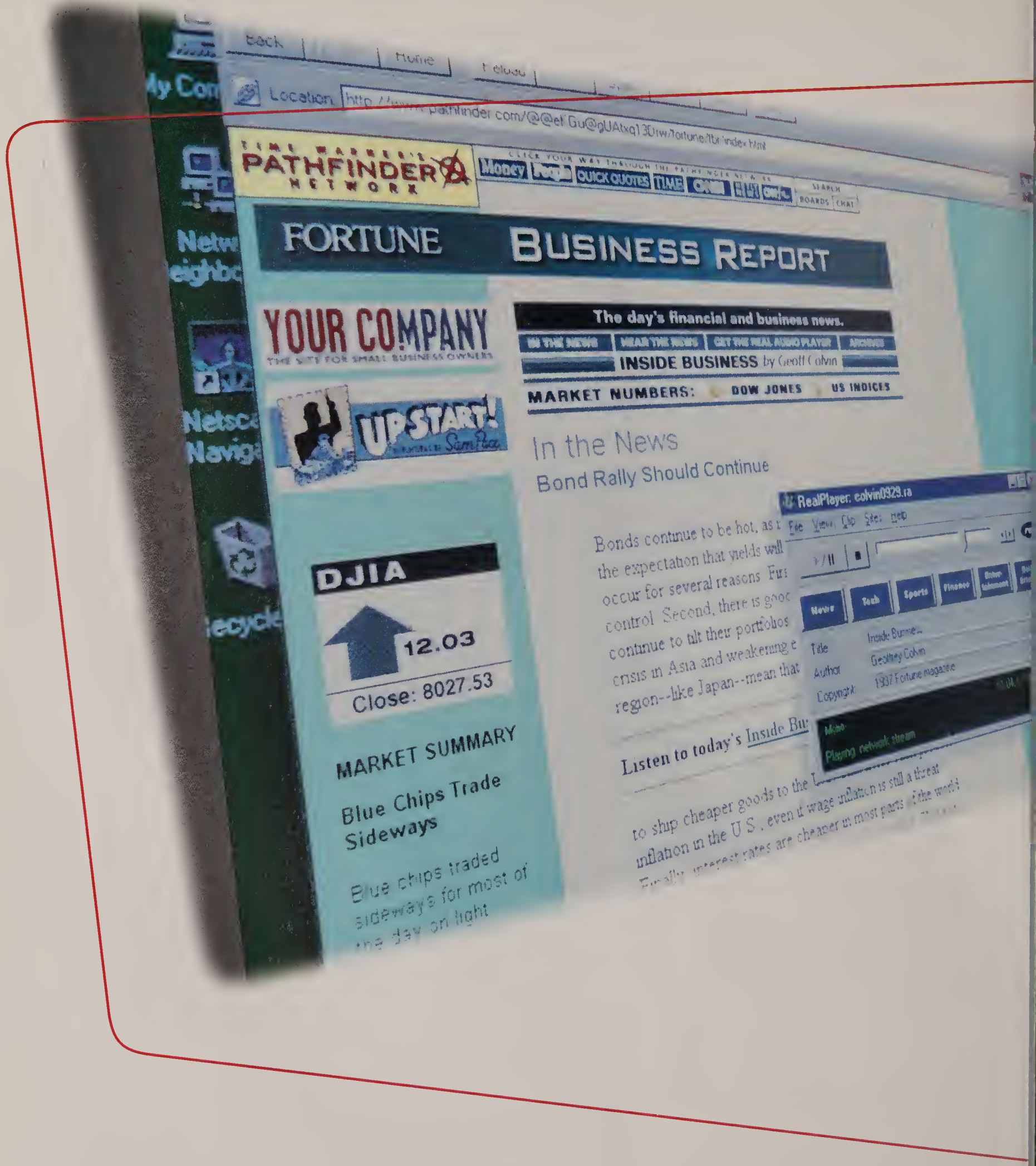

The image portrayed in this advertisement may or may not be a compilation of images from the specific site

1 All x2 products are capable of 56 Kbps downloads; however, due to FCC rules which restrict power output of service providers' modems, current download speeds are limited to 53 Kbps. Actual speeds may vary depending on line conditions. Uploads from end users to providers travel at 28.8 Kbps.

2 An x2 modem, a local analog phone line compatible with x2 technology and an Internet provider with x2 service are required for these high speed downloads. See www.3com.com/x2 for details.

3 Upgrades must be claimed by 6/30/98

4 $50 mail-in rebate valid with purchase of Sportster® 56K models 1783, 1784, 1785, 1786, 1787 and 1789, Courier™ 56K models 1867, 1868 and 1869 only, purchased 7/1/97 through 1/17/98. See www.3com.com/x2delivers for details.

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NEWS
REVIEW
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Communicator vs. Internet Explorer and the WINNER IS...

When you first meet them, identical twins are impossible to tell apart. You know that one of them has a wart, but which one? When you get to know them better, you wonder how you ever confused them.

It's the same with the long-awaited shipping versions of Netscape's and Microsoft's latest browser suites, Communicator 4.03 and Internet Explorer 4.0. Both are so alike, it's hard to tell them apart at first. They let you browse the Web, read your e-mail, and get news flashes in surprisingly similar ways. But when you look more closely, one browser is just a little better. Which is it? Based on features alone—and don't think I enjoy saying this—Internet Explorer is the prettier twin, warts and all. It pulls ahead of Communicator in two main areas: e-mail, the most popular function of the Net after browsing; and desktop integration, an IE feature that people seem to either love or hate. (See "Browser Backlash" for results from our online survey.) Unfortunately, I can't truly *recommend* IE—and not because Microsoft is in legal trouble again (see "Feds to Microsoft: Knock It Off," *Top of the News*). Why not? To be blunt, the product isn't finished yet. It appears that in the race to dominate the desktop, the two browser superpowers have launched a couple of incredibly flimsy rockets, and they're exploding in *our* faces.

I reviewed the Standard Edition of Netscape Communicator 4.03 for Windows 95/NT and the Full Installation of Internet Explorer 4.0 ▶

ILLUSTRATIONS BY JOHN BLECK

BY YAEL LI-RON

Reasons to Get It

MICROSOFT Internet Explorer 4.0 and Netscape Communicator include nearly every conceivable Internet utility—and a barrel full of features.

Microsoft Internet Explorer 4.0

* **Webified desktop.** IE offers True Web Integration for Windows 95 systems, plus enhancements like the Quick Launch bar.

* **E-mail bliss.** Outlook Express is a terrific e-mail client and newsreader.

* **OS enhancements.** The Explorer bar offers quick and easy access to Favorites, History, Channels, and Web search engines.

* **Speedier browsing.** It's faster than previous versions.

* **The price is right.** IE 4.0 is free.

Netscape Communicator 4.03

* **Cross-platform.** Communicator is available for many operating systems, making it ideal for mixed environments and non-Windows 95 users.

* **Small installation.** The stand-alone Navigator browser takes up only 8MB of hard disk space, if you don't want the whole suite.

* **Noninvasive.** It doesn't integrate with your operating system, minimizing the threat of system crashes.

* **Speedy performance.** It's faster than previous versions.

* **Gates-free.** It's not from Microsoft.

and found both to be infuriatingly shaky. Communicator sucked up my system resources and choked on Java applets, even on Netscape's own site. IE often died when I ran older programs or froze for no apparent reason, sometimes taking Windows 95 down with it.

And both suites—especially Internet Explorer—are still crawling with bugs, ranging from address boxes that don't quite work to incompatibilities with other software. IE has stung so many people with the nasty side effects of its installation that even some editors I work with won't touch it (see "Internet Explorer: The Uninstallation Trap"). So here are two products that, even after months of some of the best free beta testing a vendor could hope for, are not yet ready for the big time. The companies' reactions? Netscape releases updates as soon as it fixes a bug, but Microsoft has no patches planned.

CONFUSING DOWNLOADS

OVER THE LAST YEAR, both IE and Communicator have become increasingly unwieldy and bloated with programs that many people don't often use. In this review I focus only on both suites' Web browsers, e-mail functions, and channels, and on IE's integration with Windows 95. For my review of other components, see the online version of this article at www.pcworld.com/dec97/browsers.

Microsoft and Netscape waste no time getting off on the wrong foot. It's almost impossible to figure out what to install from their sites. It's such a hassle that you may be better off paying $10 more for a shrink-wrapped Communicator package or $5 for a CD-ROM of IE 4.0. (If you download Communicator, Netscape asks that you send $59 after the trial period; IE is free.)

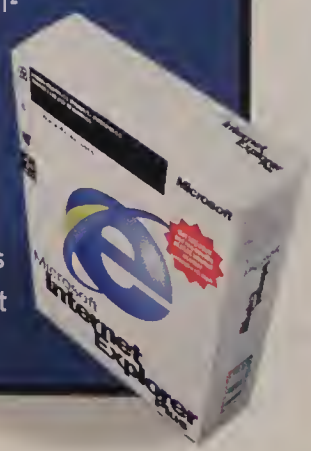
I can't imagine how a novice PC user could survive either installation. The various combinations of components are confusing, and no matter what you choose, you're forced to download huge files you may never use; you can't pick them cafeteria-style. Even worse, neither site warns you how big the files are, so you have no idea how much hard drive space you're going to lose. Netscape offers four choices on its site: the Navigator browser by itself, a Base Install, a Complete Install With Additional Components, and a Professional Edition. It took me two attempts to get what I wanted, which turned out to be the Complete Install—an 18MB download that consists of Navigator, the Messenger e-mail program, the Collabra newsreader, and a number of other components. Once I had that figured out, it installed painlessly, if not quickly: It took my 33.6-kbps modem almost an hour to download the software.

Microsoft's approach is a bit different. First, you download a small Setup Wizard program, which collects the rest of IE from one of Microsoft's FTP sites. The wizard asks whether you want to install as you download or save the files locally and install them later. It's risky to download a 24MB file while your system is being updated, so don't take chances—install it later. The wizard then asks what to download. You can pick the stand-alone browser; the Standard configuration, which adds some multimedia features (it doesn't say which) and Outlook Express for e-mail; or the Full installation, which includes a few more programs. I chose the latter; it took over 90 minutes to download and ate up a sobering 64MB of hard disk space.

I Recommend...

MICROSOFT'S INTERNET Explorer 4.0 for Windows 95—once its bugs are worked out—gets my nod. It's the better suite for two reasons: Its True Web Integration gives the Windows 95 desktop a welcome face-lift, and its Outlook Express e-mail program is far superior to Communicator's Messenger.

But before I can wholeheartedly award Internet Explorer 4.0 a Best Buy, Microsoft needs to address the suite's incompatibility issues and invasive installation procedure. I didn't experience all of these problems myself, but IE can cause severe system crashes, conflicts with other Microsoft products, and unexplained loss of hard drive space, according to our readers (and even some of the editors at *PC World*).

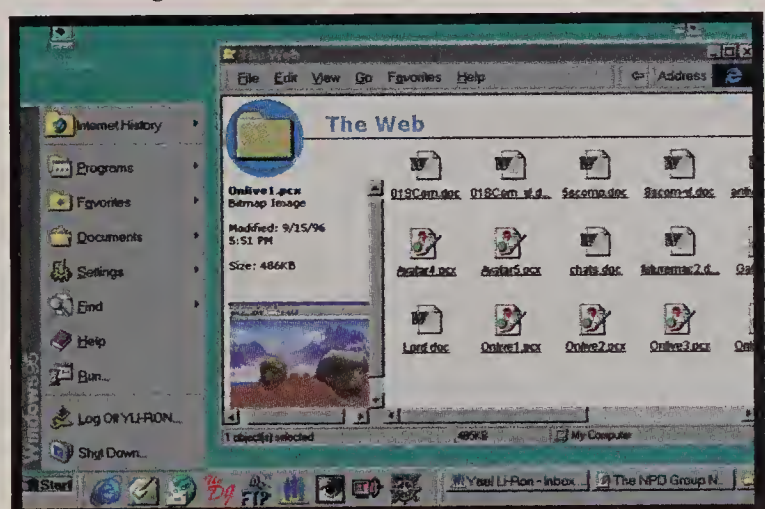


PHOTOGRAPH: KEN SMITH

The Webified Desktop

ADVANTAGE: IE The biggest difference between Communicator and Internet Explorer is the way IE can integrate with Windows 95, dramatically changing the entire user interface. Dubbed "True Web Integration" by Microsoft, it's probably the single most polarizing feature for users trying to choose between the two browsers.

People who like True Web Integration usually praise the homogenized interface. Others, who perhaps aren't as willing to retrain themselves, find it a confusing if not downright hostile new environment.



BROWSING YOUR HARD DRIVE: Love it or hate it, IE's True Web Integration will completely change your desktop.

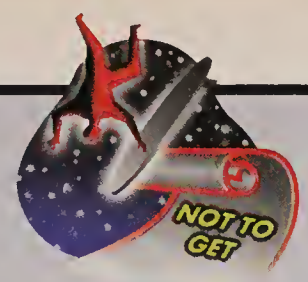
Me? I like it. In my book, a unified look and feel for Windows 95 and a Web browser is nothing short of miraculous. The new interface, called Active Desktop, is one of the best aspects of IE. Then again, if you're not online as much as I am, you may not appreciate this overhaul as much as I do. No problem. Just click *No* when the Installation Wizard asks if you want TWI, and Windows 95 will still look and act the way it always has.

TWI changes your desktop in three main ways. First, you get a new set of Windows Taskbar icons, called the Quick Launch bar, located to the right of the Start button. With a single click on a program's icon in the Launch bar, you can start that program. Second, you gain the ability to embed Web pages or push content in the desktop. Third, you get a special Channel Bar, which lets you choose push programming. In TWI mode you never need to launch Internet Explorer to find out, say, the weather in Cleveland. It's all part of your desktop, all the time. Conversely, you can also "browse" your hard drive as if it were a Web page: Just type the path of a local folder or file into the browser, and you switch to a folder view. The Start menu also inherits new abilities. With TWI installed, you can search the Internet from the Find command, and your Internet Explorer Favorites are added to the Start menu, in their own folder.

TWI also scales down the manual labor involved in simply looking at content. For instance, just moving your mouse cursor over an icon selects it. If you've set the folder to Web View, you'll see a thumbnail view of the file's contents, too. This ability isn't limited to just graphics—you can see what's inside HTML files, Microsoft Office documents, and files saved in many other formats. No more guessing what's behind cryptic file names.

Despite the name, TWI doesn't mean you're truly integrated with the Web. If I could drag and drop files between Internet sites and my desktop, *that* would be true Web integration. Also, when you open at a folder on your hard drive (instead of browsing a Web page), the toolbar modifies itself so that Web-related buttons are unavailable; I'd like to see the History and Favorites buttons everywhere I go.

But I recommend giving TWI a shot. Let the Setup Wizard add it to your configuration, and then use it for a few days. If you hate it, it's easy to disable from the Add/Remove Programs applet in Windows 95's Control Panel. Here's how: First, close all your applications. Then click *Start* and select *Settings•Control Panel*. Open the *Add/Remove Programs* applet, and scroll down its list of installed programs until you see 'Internet Explorer 4'. Select that line, then click the *Add/Remove* button. The next dialog box will ask if you want to remove IE or just disable True Web Integration. Make your selection, and after a system reboot you will be back to normal. You can also ▶



Reasons Not to Get It

NETSCAPE Communicator 4.03 and Microsoft Internet Explorer 4.0 are both remarkably unstable. Use either, and you may wish you'd never heard of the Web.

Microsoft Internet Explorer 4.0

✷ **Hard drive hog.** Unless you've got 39MB to 60MB to spare on your hard drive, you'll feel the storage pinch.

✷ **Too integrated.** When the browser goes down, your operating system can go down with it.

✷ **Big, bad beta.** It's a potentially disastrous upgrade if you're now using the beta (see "Internet Explorer: The Uninstallation Trap").

✷ **Truly weird interface.** A lot of users really don't like the changes that TWI makes to the Windows 95 desktop.

✷ **Waiting for patches.** It's still buggy.

Netscape Communicator 4.03

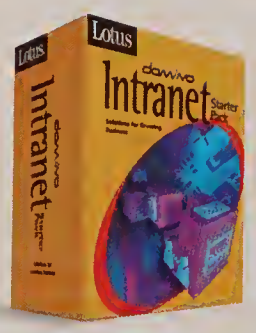
✷ **Mixed-up menus.** The interface is inconsistent between modules.

✷ **Not fully implemented.** It doesn't always act like a fully-functional Windows 95 application (for example, its right-click functionality is sporadic).

✷ **E-mail challenged.** The e-mail client can't retrieve mail from multiple accounts all at once.

✷ **I have to pay good money for this?** Communicator isn't free.

✷ **User-unfriendly.** It's still buggy.



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disable other options, such as the ability to open a program or document with a single click, if you find them frustrating.

It's unclear what Microsoft has in store for the Windows 98 user interface. The current beta features IE as the default interface, but if enough users complain in the next few months, I'm sure Windows 98 will let you make that choice.

And Netscape? Communicator scratches the surface of TWI's OS integration with Webtops, which are either Web pages or channels that float on the Windows desktop—just like IE's Active Components. Still absent in Communicator's current version is file management, but at the time we went to press, Netscape announced its upcoming Aurora technology, which should fill the Web/OS integration gap between IE 4.0 and Netscape Communicator 4.03.

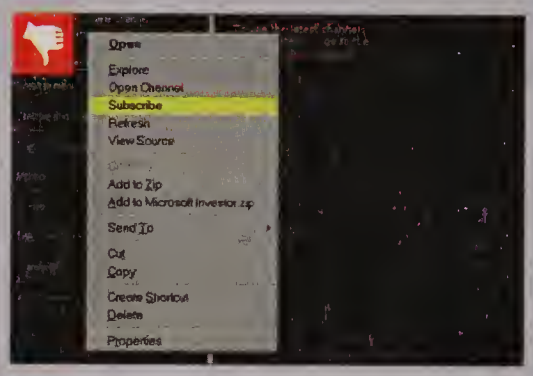
Aurora is Netscape's planned desktop shell—an integrated operating system and browser—that was demonstrated for the first time last September. The Aurora software is similar in appearance to a program called Constellation that the company first demonstrated in November 1996; it was released in modified form as Communicator's push client, Netcaster.

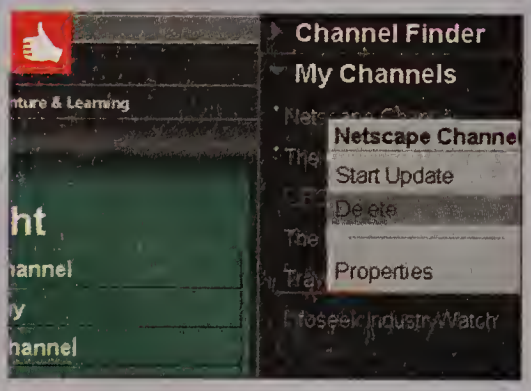
Netscape says Aurora should ship in mid-1998, about the same time that Windows 98 is due out. Aurora looks very promising, and its cross-platform angle may be just what Netscape needs to win the next browser battle. Internet Explorer's True Web Integration is, after all, a Windows-only feature.

Component Comparison: Six Common Tasks

AS SIMILAR AS THEY ARE, Microsoft's Internet Explorer and Netscape's Communicator handle some tasks, such as collecting e-mail, very differently. We compared the browsers head-to-head in six areas and picked the better implementation (if there was one).

Using Channels

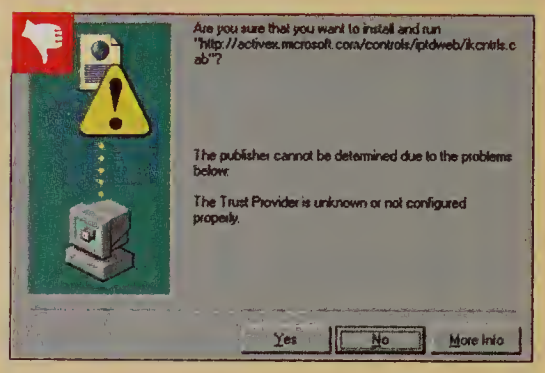


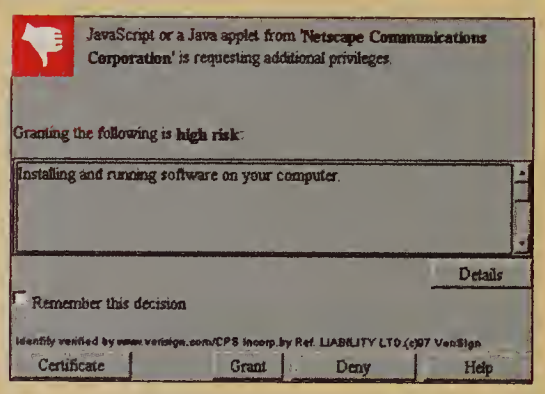


TOP: Internet Explorer's Channel Bar interface makes it difficult to figure out how to see which channels you've subscribed to and how to unsubscribe from them. You can see all your subscriptions in Manage Subscriptions, under the Favorites menu. To unsubscribe from a channel, you have to choose *Properties* from the right-click menu.

BOTTOM: What you see is what you get. The My Channels list in **Communicator's** Netcaster is what it seems: a listing of the channels you've subscribed to. Once you delete them from the My Channels menu, you're unsubscribed.

Setting Security Options

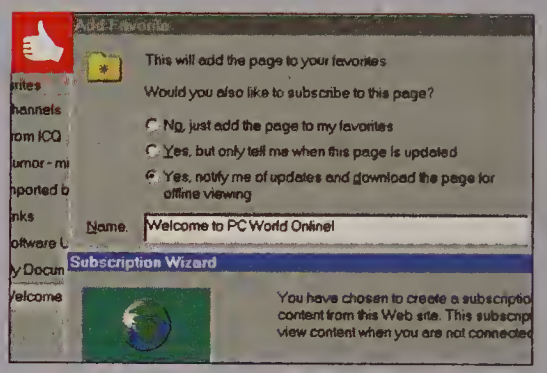


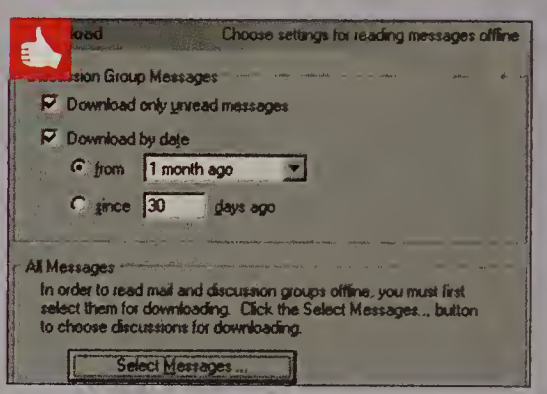


TOP: Both browsers come with a wealth of security options. But the interfaces are so full of confusing jargon it's tempting to give up and choose the highest settings. If you do, you'll puzzle over warnings like this one in **Internet Explorer,** which cautions against accepting an ActiveX control from Microsoft's own Web page.

BOTTOM: Navigator makes use of Site Certificates to ensure that any Java applets that you download from certified Web sites are safe for your machine. Unfortunately, even Java applets from Netscape's own Web site can be presented by Navigator as "high-risk" downloads.

Browsing When Offline





TOP: Both browsers let you download and browse offline Web pages, e-mail messages, and newsgroup postings. **Internet Explorer** also lets you subscribe to sites. This tells the browser to check sites at a specified interval for changes, notify you of any of those changes, and (if you prefer) download Web pages for viewing when you're not connected to the Internet.

BOTTOM: In **Communicator,** you can conveniently use only one dialog box to set up all your Web page, e-mail, and newsgroup downloads simultaneously. In IE you have to go to both the browser and Outlook Express to set up downloads.

The Browsing Experience

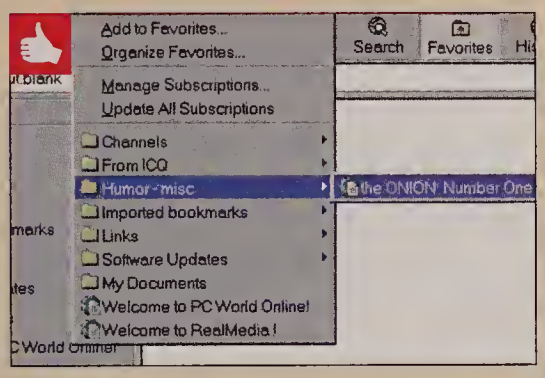
ADVANTAGE: IE Although both browsers display pages in a similar way, they get there in very different ways. IE's features outdo Communicator's clunky interface.

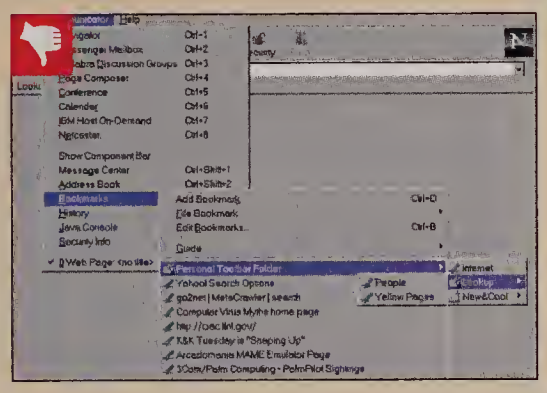
Afraid you'll pick the wrong browser for viewing the coolest Web sites? Don't be. Both IE and Communicator's Navigator browser display most pages identically. Most differences you see are a result of the way they each implement Dynamic HTML, an extension of HTML that adds an extra level of interactivity and multimedia capability. Even so, no sane Webmaster, no matter how fond of either browser, would lock out a huge segment of Web surfers by designing for one product and not the other. The name of the game here is traffic. About the only places you'll see a noticeable difference in how either browser displays a page are Netscape's and Microsoft's own Web sites, which are, naturally, programmed with the company's own flavor of DHTML—and even there the only things you'll miss by using the opposing browser are some animations, which may be reduced to static elements. So relax, and don't let the myth of "optimized for *browser x*" affect your decision.

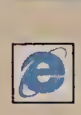
Navigator and IE differ a lot more in how they *take* you to Web sites. At their most basic level—the Back and Forward buttons—they're the same. Right-clicking on either button brings up a menu of all the pages you've visited in the current session. But what if you want to find a site you visited several days, weeks, or even months ago? Once again, IE gains the edge over Navigator.

For instance, both browsers offer an ergonomic boon called AutoComplete, which fills in the URL of a previously visited site once you've typed a few characters into the address box. But IE's implementation is slightly better, because you need to type only part of an address and then press the up or down key to cycle through similarly spelled URLs. This speeds up finding addresses that are ▶

Bookmarks/Favorites



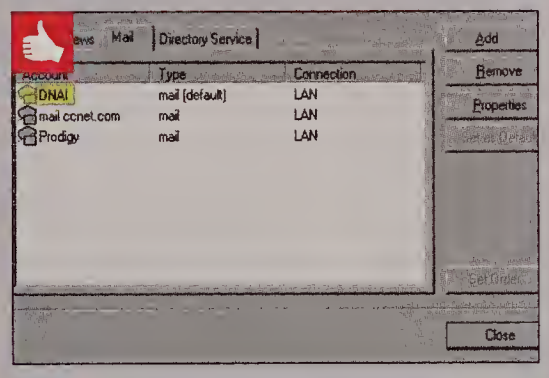


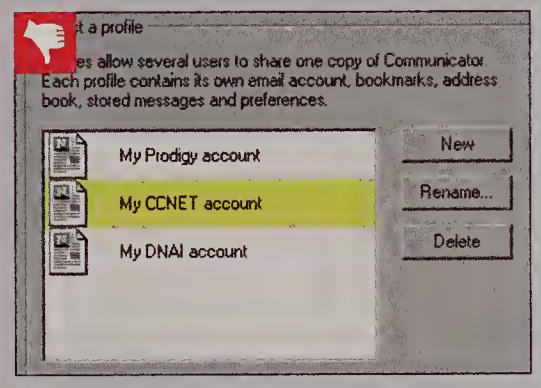


TOP: Organizing the Web sites you've chosen as Favorites in **Internet Explorer** is easy: Just go to *Organize Favorites,* located at the top of the Favorites menu. It lets you create folders and subfolders, categorize your Favorites, and generally set them up the way you like.

BOTTOM: In **Navigator,** you can now embed a row of Bookmarks right into the main interface, beneath the address window. Unfortunately, to get to this feature (called the Personal Toolbar) you have to go to *Edit Bookmarks* under the Communicator menu—a counterintuitive step we had to figure out ourselves. Confusing? Yes!

Managing E-Mail

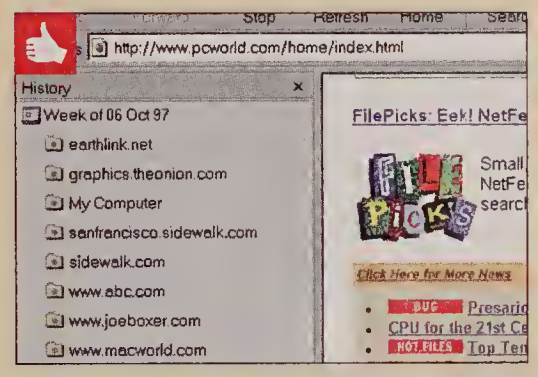


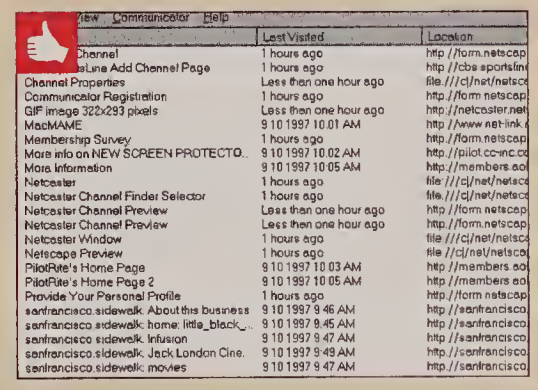


TOP: Got more than one e-mail account? Not a problem with **Internet Explorer's** Outlook Express. It keeps separate settings for multiple accounts, while allowing you to download all your e-mail in one fell swoop.

BOTTOM: Communicator's Profile Manager handles multiple e-mail accounts as if they were owned by different users. This makes individual accounts secure when many people use the same computer to check mail. However, if you're the only user, you'll have to quit and then restart Communicator every time you want to get mail from a different account.

Web Site History





TOP: Internet Explorer's History feature conveniently pops up in the left window pane, but it organizes previously visited sites only by date. To locate a site by name, you'll have to search for it in Windows 95's Explorer.

BOTTOM: Navigator's History enables you to sort sites by date, address, or even the number of times you've visited, all in a single window. The downside to this approach? The sites are not displayed in a pane within the browser window: You have to open a separate window—and switch between it and the browser—to use Navigator's History.

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A similar feature allows you to type in just the URL's domain: For instance, enter 'ibm' and both browsers will go to www.ibm.com. But IE takes this time-saver a step further by checking other possible domain-name suffixes besides .com. If, for example, you type 'berkeley' into Navigator, you'll be told that www.berkeley.com doesn't exist. But IE will go to www.berkeley.edu. And if IE can't find an address, it'll take you to a page of possible matches from Yahoo.

Both browsers offer a couple of other ways to help you keep track of where you've been. Internet Explorer's Favorites and Navigator's Bookmarks, those ever-popular links you can create for sites you visit frequently, are still around. To see the contents of your Favorites folder, go to IE's Explorer bar, a left pane you can open by clicking a button. Navigator displays its Bookmarks as a drop-down menu. (See "Component Comparison: Six Common Tasks" for more about Bookmarks and Favorites.)

Trying to remember which site you visited last Tuesday, the one about vacationing in Costa Rica? Look it up in either browser's History list, which keeps a blow-by-blow audit trail of your Web travels. IE's is easier to get to, but Navigator's is more easily searched.

In IE 4.0, a chronological list of every page you've visited in the previous 1 to 999 days pops up in the left-pane Explorer bar when you click a button. Another nice touch: Pages visited in the last two weeks are labeled Monday, Tuesday, and so on, instead of with dates, which makes it even easier to immediately grasp the day. (Navigator doesn't do this.) To go to a site, just click on it, and it opens in the right pane. Navigator's history opens up in a separate window, which isn't as convenient, but you can sort sites by name, address, or the date of the last visit—something IE can't do within the right-pane of the browser.

Messages and Posts

ADVANTAGE: IE Outlook Express, IE's e-mail and newsreader program, has more useful features than the Communicator equivalent, Messenger.

Most people tend to think of the IE and Communicator suites as a couple of browsers with a lot of other stuff thrown in. One of those other applications just happens to be e-mail, that great unsung hero of the Internet that keeps us all burning up the digital lines. If you need a versatile Internet e-mail package or like participating in newsgroups, listen up, because there are big differences between IE's Outlook Express and Communicator's Messenger e-mail programs.

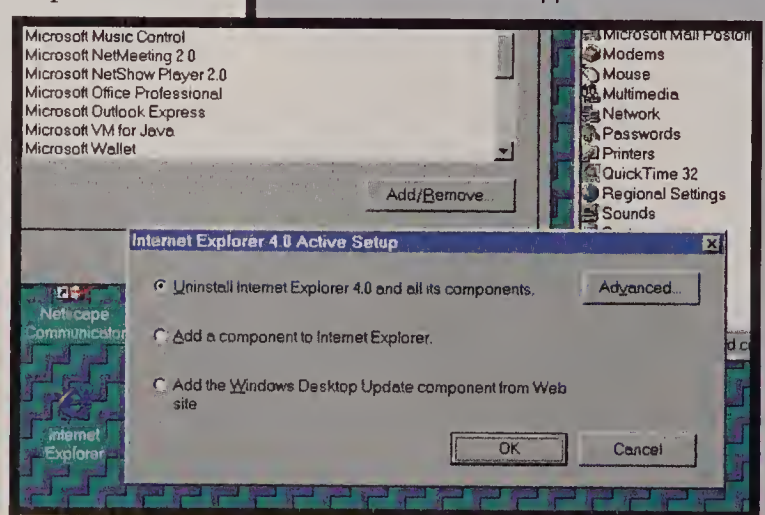
First, the similarities: Netscape and Microsoft both brag about their e-mail programs' support for a long list of acronyms such as SSL and IMAP4. It just means that they both let you create, send, and receive e-mail either as plain text or as HTML-based "rich text" with fonts, colors, and graphics. Both also let you send and receive digital files and organize messages in folders, and both support industry standards for security and encryption.

Outlook Express has a few extra features that Messenger doesn't, but mainly it just doesn't irritate me as much. For instance, Outlook Express can remember your password from session to session, if you set it to do so; Messenger makes you type in your password every time you open it. And from the Department of Redundancy Department: Outlook Express lets you click either a Reply or Reply to All button. After you select Messenger's Reply menu, you then have to choose between Reply and Reply to All—an extra step.

Outlook Express deserves a slap on the wrist for hiding its mail filters in the cryptic Inbox Assistant option, which lurks under the Tools menu. However, it redeems itself with the ability to generate canned responses to e-mail mes- ▶

Internet Explorer: The Uninstallation Trap

IF YOU'RE ONE OF THE MANY users who installed Internet Explorer 4.0's beta release when it was made available earlier this year, you may end up with some serious headaches when it comes time to install the final version. It's a case of catch-22: You can't install IE 4.0 unless you've completely uninstalled the beta—and you can't completely uninstall the beta. I've seen this happen on dozens of machines, some of them my very own.



REMOVING TWI: This dialog box permits you to remove all of Internet Explorer's files, or just the TWI elements.

I thought the whole beta was removed from my system when I uninstalled it. I realized later that only a quarter of the program (about 12MB) was gone. Upon closer examination, I found many IE 4.0 files and folders still intact. Some I removed, but others I was afraid to delete because they looked dangerously like system files that could possibly affect Windows 95. The Windows Registry also had some leftover entries that I ended up removing manually. (Warning: Don't do this yourself, unless you know what you're doing.) When I installed the new version, the inevitable errors starting popping up: missing files, corrupted data, and the most annoying of all—'Java not installed'. My system became unstable to the point of meltdown. Following a second uninstall—with some handholding from Microsoft's tech support—I removed the files.

PC World Online has prepared a step-by-step uninstall guide for users of the beta (located at www.pcworld.com/dec97/browsers). Print it out and put it next to your system *before* you install the latest version of Internet Explorer 4.0. Otherwise, you may live to regret it.

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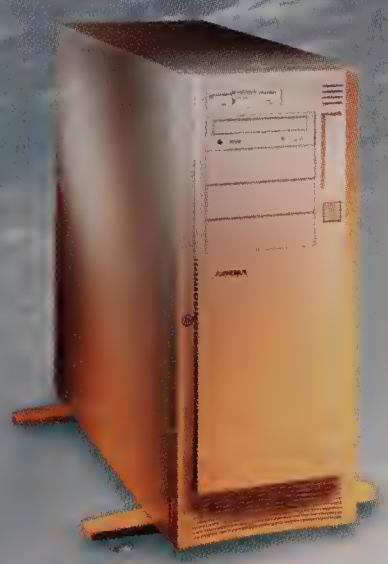

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sages—something Messenger can't do.

My biggest beef about Messenger, though, is the way it handles multiple e-mail accounts. You have to use something called the Profile Manager to set up each one separately. To check your e-mail, you must log in, get your mail from one account, close Messenger, then log back in under another account "profile," ad nauseam. Outlook Express, by contrast, checks all your accounts in one fell swoop.

Messenger's sole e-mail–checking advantage is its handy Mail Notifier applet, which keeps an eye on your e-mail (again, for only one account) when the program isn't running. When new mail has arrived, a red flag pops up in the System Tray to remind you to open your in-box.

Are you a newsgroup fanatic? A version ago, both IE and Communicator added newsgroup-reading abilities to their e-mail programs, so now you don't have to use a separate application to post or read Usenet messages. In this realm, neither Messenger nor Outlook Express has any unique advantage over the other.

Customize This!

ADVANTAGE: NEITHER Communicator and Internet Explorer are "totally customizable," claim both Netscape and Microsoft. That's totally one big piece of hype.

Sure, you can choose the suites' default colors and fonts—big deal. What if you want to do something a little more creative, like change the toolbars? If you're expecting something along the lines of the truly totally customizable Microsoft Office 97 suite, forget it. With Office, you can drag buttons on or off the toolbars, change and even create images on these buttons, and create additional toolbars if you like. The closest you get to that in Internet Explorer is the Links bar (a collection of editable shortcuts) and the Quick Launch bar (available only if you've installed IE's True Web Integration feature). If you right-click any icon on either of these toolbars, you can rename, delete, and move it around at will.

Netscape promised right-click configuration menus for Communicator's Personal Toolbar (the counterpart to Internet Explorer's Links bar), but you won't find them in this version. Limited to a few canned Netscape icons, the Personal Toolbar is even less configurable than IE's bars, and you'll have to go several levels deep into the Bookmarks menu to find your options.

To reposition any of the toolbars in either product, you need only one thing: luck. All you can do with Communicator's toolbars is minimize them. IE lets you move toolbars around, but just try to undo what you've done. Ready for a fun game of digital Rubik's Cube? You can shuffle IE's toolbars up and down, right and left, and still never get quite the combination and alignment you want.

Crossing the Channels

ADVANTAGE: BOTH In my opinion, channels are bandwidth-hogging glorified spams. Which is why I subscribe to only 47 channels in Internet Explorer and 65 in Communicator's Netcaster component.

Okay, so channels have their place. And these two browsers give you access to more channels than an 8-foot satellite dish. Besides the channels that come bundled—everything from ABC News to CNN and Disney—you can add any ▶

Browser Features: How They Stack Up

When you compare the two suites, Internet Explorer surpasses Communicator in key areas.

FEATURES	Communicator 4.03	Internet Explorer 4.0
Navigation/browser		
AutoComplete	very good	excellent
History	very good	very good
Bookmarks (Communicator)/Favorites (IE)	very good	excellent
Configurable toolbars [1]	good	excellent
Customization	satisfactory	good
Support for Java and JavaScript	very good	very good
Support for ActiveX	none	very good
OS integration		
Consistent interface between OS and browser	none	very good
File management	none	very good
Availability of channels on desktop	very good	very good
E-mail and news features		
Signatures	satisfactory	very good
Multiple accounts	satisfactory	excellent
Filters	excellent	excellent
Rules (autoreplies)	none	very good
Integration of newsreader into in-box	excellent	excellent
Security features		
Ease of disabling Java, JavaScript, and cookies	very good	very good
Channels		
Ease of subscribing	very good	very good
Ease of unsubscribing	good	poor
Display options [2]	good	very good
Number of channels included at installation	20	32
Minimum system requirements		
Size of installed suite on hard drive	18MB	64MB
Minimum RAM required	16MB	16MB

Both browser suites provide encryption and support POP3/SMTP, HTML-based rich text, Secure Sockets Layer, and signed and certified applets and/or controls.

[1] Personal Toolbar in Communicator, Quick Launch bar in IE.

[2] Channels may appear on the desktop, within the browser, or as screen savers.

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Web site that provides channel programming for your browser. Hundreds of sites provide content for channels (just look for the Netscape Netcaster or Internet Explorer Active Channels button on the site), so there's no shortage of choices.

Subscribing is easy: Just click a featured channel, then click *Subscribe* in Netcaster or click *Add Active Channel* in Active Channels, and you're there.

Netcaster features the channels you've subscribed to in a bar called My Channels. To unsubscribe to a channel, just right-click on the appropriate item in the My Channels menu. You can also click the *Options* button located at the bottom of the bar. When I tried it, a dialog box featuring all of my subscribed channels popped up, allowing me to remove the ones I wanted.

But alas, Internet Explorer's Active Channels bar wasn't as accommodating. First of all, I couldn't even find a list of channels I'd subscribed to. I went back to the Microsoft Channel Guide, thinking that any of my subscribed channels would surely be marked "already subscribed" or some such wording. I remembered that I subscribed to CNN, so I checked it first. No such luck—there was no indication that I'd subscribed.

Could I unsubscribe from the Microsoft Channel Guide? I right-clicked one of the channels, and hurray: There was a pop-up menu with lots of options, including Update Now—but no Unsubscribe. It took two calls to technical support to figure it all out. The only place you can find a list of your channel subscriptions is in the Windows\Subscriptions directory. You can go there in Windows Explorer, or you can choose *Manage Subscriptions* (which is located under the Favorites menu, of all places).

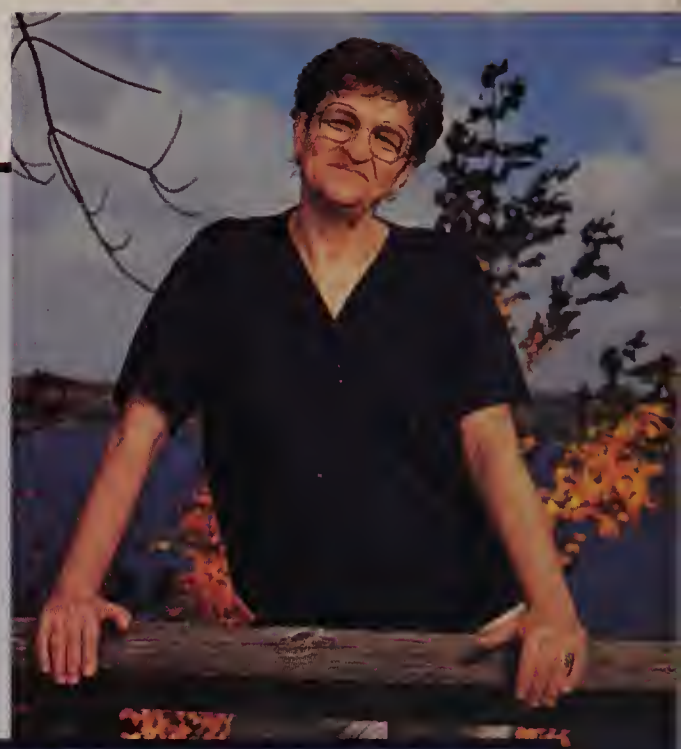
How do you unsubscribe from Internet Explorer? You can either delete channels manually in the Subscriptions directory—my preference—or select the *Subscriptions* tab in the Properties dialog box and click on *Unsubscribe*.

Now wasn't that easy?

Browser Backlash

WE ASKED 2000 PC WORLD Online subscribers which of the two browsers they prefer. Many picked Netscape Navigator—often an old version. Some people don't like how IE's True Web Integration dominates their desktop. Others just don't like Microsoft.

Here's a sampling from both sides of the browser-wars fence:



Microsoft Internet Explorer 4.0

"I have both on my computer, but I find that Internet Explorer's interface more closely matches the other Microsoft programs I use, like Office 97. It makes more sense to me, and I work better in it, but 'channels' don't make any sense at all."

ROBERT HOCKENBERGER, IT TRAINER

"I just hated Internet Explorer 4.0. It totally took over my desktop, and when I uninstalled it, it left files that I still can't delete. I've been having problems ever since. I'll continue to use Netscape Communicator."

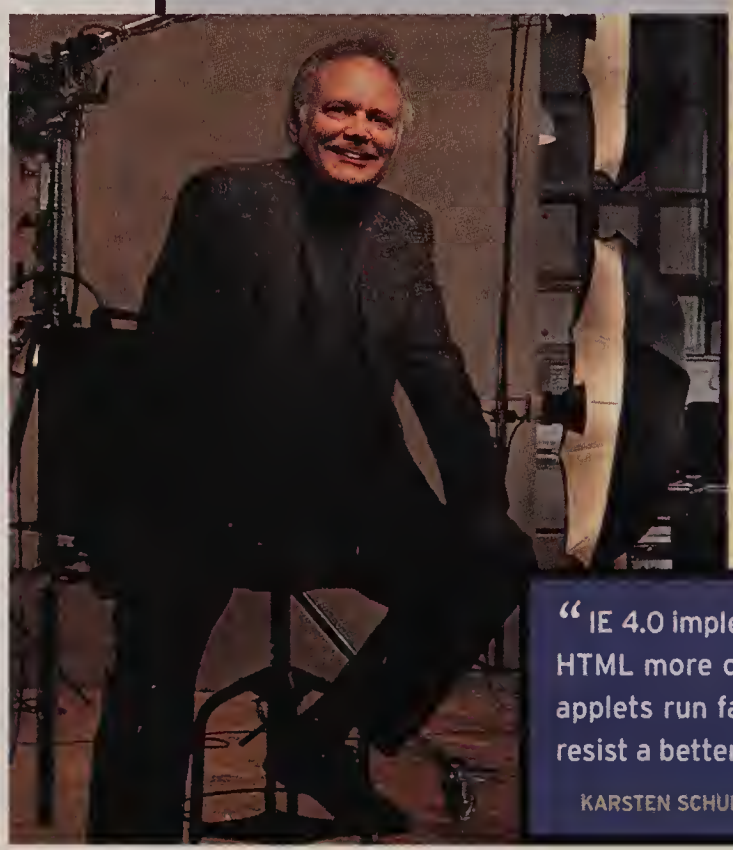
MARGARET GRIFFITHS, TAX PREPARER

"A lot of people have had trouble with IE 4.0, but I'm not one of them. The installation, usability, and navigation have been flawless! I also like the Channels buttons; Communicator fares poorly when you compare the two push clients side by side.

CLYDE E. NEDD, CIS STUDENT

"I switched to IE 4.0 because of its True Web Integration, but I would use Netscape's product if they could do what Microsoft has done. Netscape may have lost the race this time."

ROBERT PURDY, IT MANAGER



"IE 4.0 implements the latest HTML more cleanly, and Java applets run faster. It's hard to resist a better product."

KARSTEN SCHULZ, GRAPHIC DESIGNER

Netscape Communicator 4.03

"I switched back to Navigator 3.03 because it is small, fast, and does everything I want it to. IE 4.0 hogs as much hard drive space as you can spare—or don't want to spare. I can set the cache without a problem in Navigator. Internet Explorer hogged everything on my hard drive except what Windows 95 hogged for its cache. Microsoft can eat my shorts."

COREY AASEN, VALUE-ADDED RESELLER

"Netscape's new Bookmarks layout is a major improvement. I like the look and feel of Communicator better, and I don't get the feeling that it's trying to take over the rest of my desktop. Netscape should alphabetize the Bookmarks automatically, or at least give you the option to do it."

DAVID ADAMISIN, SOFTWARE DEVELOPER

"Until the IE enhancements are integrated into Windows 98, I'm staying with Netscape Navigator Gold 3.03. It's small and does the job right. The others take up a lot of hard drive space, and I never use half the programs I had to download."

GARY MEYER, NETWORK SPECIALIST

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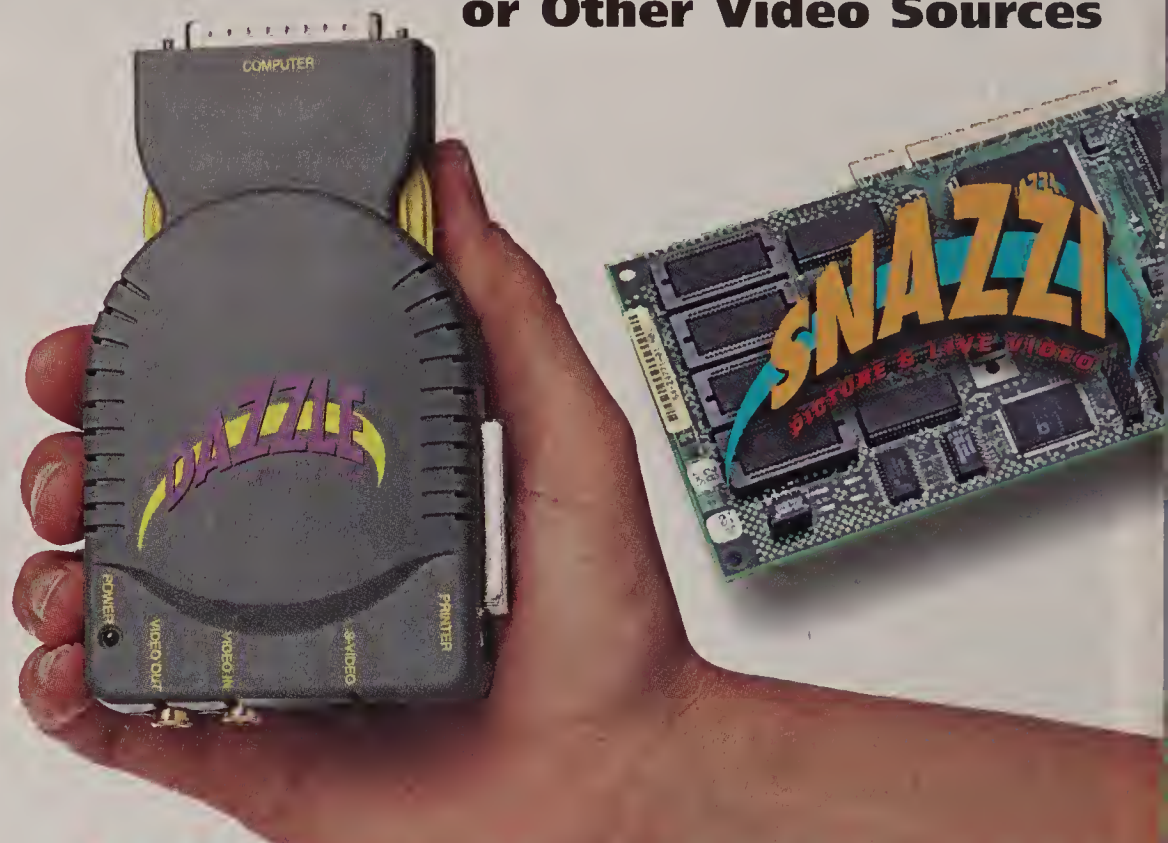

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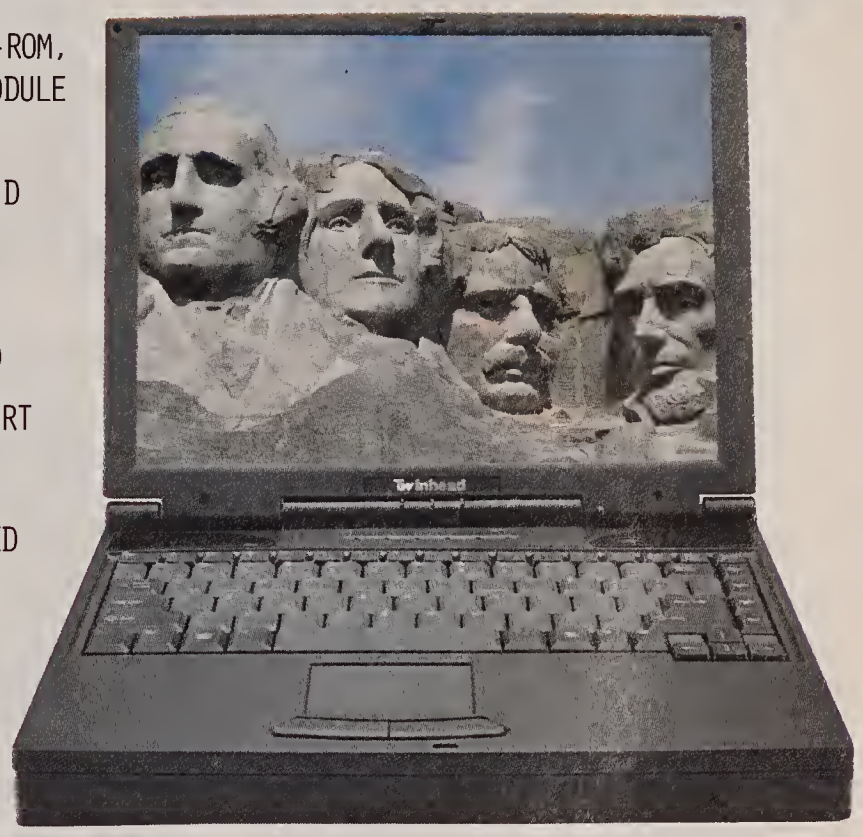

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Security and Privacy

ADVANTAGE: BOTH While neither browser is 100 percent safe, both provide plenty of options for protecting yourself against the dangers of the Web.

The most popular pastime among academics these days seems to be "Find the browser security hole." Both Netscape and Microsoft are regularly humiliated by front-page news about vulnerabilities in their products, ranging from "features" that let people steal passwords to vicious Java applets and ActiveX controls that can wipe your hard disk clean. Some of this "news" is nothing more than rumors spread by people who, not coincidentally, have developed utilities for plugging the holes. Other announcements have merit. In each case, both companies have reacted swiftly by posting patches on their sites that address the weakness.

Are the current IE and Communicator versions safe? It's doubtful they're 100 percent airtight, and I'm sure more holes will be discovered in the future. But should you worry? I'd say no, because both companies are committed to fixing the problems. You can take steps, however, to minimize the danger of security breaches. Disable Java and JavaScript in either browser, and disable ActiveX in IE. Doing so will affect nothing but the most high-end features of a particular Web site, and you can switch them back on. Both packages also offer encryption within their e-mail clients, and both let you choose to accept or decline cookies automatically or on a case-by-case basis.

Both products also support "signed" downloads—applets that have been certified by third parties such as VeriSign. When you download an applet whose source is unknown or whose certification has expired, you're warned and asked whether you want to proceed anyway.

Both products could do a better job of making their security options easier to figure out. IE, for instance, offers an extra level of safety called Security Zones. This menu-based feature lets you specify that some sites—for example, your corporate intranet—are safer than others, so all applets from those sites are deemed welcome. The three default zone definitions are Low, Medium, and High. The browser accepts all downloads from Low security zones, warns you before accepting them in Medium (or Internet) zones, and rejects them all in High security zones. You can customize zones with any combination of security options you want.

Nice idea, but it's too much of a hassle. I doubt that anybody will use it, with the possible exception of corporate IS departments. I played with Security Zones a bit when I first installed IE, but then I set all sites to High (except PC World Online, of course). Every once in a while I get a warning that I can't proceed browsing a certain page, because certain applets or controls haven't run; I just override the settings.

Who Will Win

IF YOU VISIT WEB SITES only occasionally, rarely if ever send e-mail, and don't care about channels, then you probably won't see much difference between the browsers. For basic Web surfing, either suite will work fine. But if you need a good Internet e-mail program or are ready for a nifty new way to manage your desktop, go with IE 4.0—after Microsoft fixes it.

Both products are still very unstable. Communicator, whose first version was released a full four months before IE, still crashes too often. Some readers report that IE 4.0's most striking feature—True Web Integration—crashed their systems so severely that they had to reinstall Windows 95. That never happened to me. Both programs bogged down my machine and caused minor problems, but nothing on the scale of some users' experiences.

So even with its bugs, I find IE's integration with Windows 95—along with its e-mail functions and its ability to browse Web sites offline—irresistible. And once the bugs are gone? In this latest browser battle, Internet Explorer 4.0 stands a very good chance of coming out on top.

For an expanded version of this article, visit www.pcworld.com/dec97/browsers. Yael Li-Ron is executive editor, features, for PC World Online. ■

Web Browser Wish List

NO PRODUCT IS PERFECT. What would I change in Microsoft's Internet Explorer and Netscape's Communicator if I could? These are a few of my least favorite things:

Micosoft Internet Explorer 4.0

✶ **Rewriting History.** Trying to find a specific URL in IE's chronological History menus is a pain. I'd love to be able to search for character strings.

✶ **What's with the blue spheres?** At first glance, the four Quick Launch icons look round, bluish, and abstract. How about letting us customize them?

✶ **I want my FTP!** True Web Integration won't be complete until Microsoft adds drag-and-drop FTP capability between Internet sites and the desktop.

Netscape Communicator 4.03

✶ **E-mail blues.** Netscape needs to get with the times and simplify Messenger's process of checking multiple e-mail accounts.

✶ **Remember me?** Communicator does not remember your passwords from one browsing session to the next. You'll be asked to type in your user ID and password each time you go to a password-protected site. IE types it in for you and asks you to confirm by clicking OK, which is a little better.

✶ **Bookmarks growing on trees.** Managing Bookmarks is a frustrating feat. You have to rely on a hierarchical menu and dialog boxes that are awkward and inconsistent with the rest of the Communicator suite.

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Packed Performer

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Included Zip drives.

The entire Millennia family comes standard with a 100MB Iomega Zip drive — giving you virtually unlimited storage! And you can easily transport files from home to work, saving and using multimedia files and applications. A Zip drive also gives you a built-in backup system for your computer.

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Upgrade your Millennia system with Fusion 3D and you'll get a DVD drive, incredible 3D graphics, AWE 64 ISA sound card, a two-speaker satellite with a subwoofer, an exciting game bundle and a Microsoft® SideWinder joystick. You won't believe how your games and multimedia applications spring to life like never before!

How did the Millennia get so good? With the help of Micron's Consumer Products team left to right: Bob, Jon, Lori, Jeff, Tina, Christy, Rich, and Casey.

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Business Solutions

Our Server and ClientPro Product groups mean big business. They are (clockwise from bottom): Amber, Jody, Tracey, Rex, Rob, Amanda and Todd.

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With the introduction of Micron NetFRAME servers, you'll get the latest server technology, custom-built for thousands less than you'd expect.

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NetFRAME Systems has designed enterprise-class servers since 1987, delivering an unprecedented ability for businesses to use their networks for maximum advantages. So when Micron acquired the company this year, we were ready to build on NetFRAME's reputation and proven experience.

The Micron NetFRAME MV5000 server gives you enterprise-level features at a mid-range price point, and you'll get the security and high availability of fault-tolerant components including hot-swappable and redundant hard drives and power supplies. Our Micron NetFRAME LV2000 server delivers integration and stability at a low price. And our Micron NetFRAME 9008 and 9016 series offer excellence in enterprise servers.

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Micron's dependable ClientPro systems are network-ready and can handle all your business computing tasks. ClientPro systems are built on a stable platform, and with Intel Pentium or Pentium II processors, they pack the power to run the latest technologies — so you'll have a reliable business PC that reduces the risk of downtime and lowers your total cost of ownership. The new ClientPro MRE includes all the latest management tools like DMI 2.0, LANDesk 3.1 and Wake On LAN adapters for enhanced remote management, and chassis intrusion alert for security protection.

Micron's server and client product teams always bring you complete networking solutions. And you'll get Micron's award-winning customer service, 24-hour technical support, and a limited warranty that's hard to beat.

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Revolutionizing workstation performance, Micron introduces our exclusive Samurai™ chip set on the Powerdigm XSU workstation. A powerful, Intel processor-based workstation, the Powerdigm XSU will execute your most demanding business and technical tasks — and it's flexible enough to run the most popular PC programs.

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Making it the workstation to beat are Powerdigm team members, left to right, Stephanie, Terry and John.

MMX™ intel inside pentium® II processor

Business Solutions

NetFRAME® LV2000

Intel 233MHz Pentium II processor
ECC Level 2 cache on processor
32MB ECC SDRAM
2GB Ultra-Wide SCSI-3 hard drive
Microsoft® Windows NT® Server 4.0 (10-user license)
Intel LANDesk® Server Manager 2.8
NOS Support (3 incident resolutions/1st year), 7x24

STANDARD FEATURES
Single or dual Intel Pentium® II processors
512KB integrated cache in SEC package
ECC SDRAM option (4 DIMM slots)
5 expansion slots: 4 PCI, 1 ISA
Integrated Adaptec PCI Ultra Wide SCSI-3 controller
Integrated Intel EtherExpress™ Pro 100 controller
12X SCSI-2 CD-ROM drive
10 drive bays: 4 external 5.25"/1 external 3.5"
2 internal 5.25"/3 internal 3.5"
Dedicated server technical support, 7x24
5-year/3-year Micron Power℠ limited warranty
1-year next-business-day on-site service***

$3,499
Bus. Lease $119/mo.

NetFRAME MV5000

Intel 300MHz Pentium II processor
ECC Level 2 cache on processor
64MB ECC SDRAM
4GB Ultra-Wide SCSI-3 hard drive
Microsoft Windows NT Server 4.0 (10-user license)
NOS Support (3 incident resolutions/1st year), 7x24

STANDARD FEATURES
Single or dual Intel Pentium II processors
512KB integrated cache in SEC package
Memory: ECC EDO or ECC SDRAM option
9 expansion slots: 6 PCI, 2 ISA, 1 shared ISA/PCI
Dual integrated Symbios Ultra-Wide SCSI-3 controller
Integrated Symbios Narrow SCSI controllers
Embedded RAID Upgrade option
I2O ready via embedded Intel i960-RD
5 Internal, hot-pluggable, hard drive array bays (Upgradable to 10)
1 (one) 360 watt hot-pluggable power supply standard (Upgradable to 3 for added redundancy)
Rack Adapter Option
Intel LANDesk Server Manager 2.8
Dedicated server technical support, 7x24
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1-year next-business-day on-site service***

$6,199
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***On-site service for NetFRAME LV2000 and MV5000 server is provided by Digital Equipment Corporation and is optional.

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Intel 166MHz Pentium processor with MMX™ technology
32MB EDO RAM, support for SDRAM
1.2GB SMART EIDE hard drive
15" Micron 500Lx, .28dp (13.7" display)

512KB pipeline burst cache, flash BIOS, DMI 2.0
3Com 3C509 ISA Ethernet T-P NIC
16X EIDE variable speed CD-ROM drive
S3 ViRGE graphics accelerator, 2MB EDO RAM
Microsoft Mouse
Microsoft Windows® 95
5-year/3-year Micron Power limited warranty

$1,399
Bus. Lease $48/mo.

ClientPro MRE

Intel 200MHz Pentium processor with MMX technology
64MB SDRAM
2.1GB Ultra ATA SMART EIDE hard drive
15" Micron 500Lx, .28dp (13.7" display)

512KB pipeline burst cache, flash BIOS, DMI 2.0
Pro 100 with Wake On LAN Network Adapter
16X EIDE variable speed CD-ROM drive
S3 ViRGE graphics accelerator, 2MB EDO RAM
Intel LANDesk Client Manager
Advanced hardware monitoring and power management features
Chassis intrusion alert
Microsoft IntelliMouse
Microsoft Windows 95
5-year/3-year Micron Power limited warranty

$1,699
Bus. Lease $58/mo.

ClientPro XLU

Intel 266MHz Pentium II processor with MMX technology
64MB EDO RAM
2.1GB SMART EIDE hard drive
17" Micron 700FGx, .28dp (16" display)

512KB internal L2 secondary cache, DMI support
3Com PCI 10/100 ethernet NIC
16X EIDE variable speed CD-ROM drive
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
Upgradable wavetable audio with speakers
Microsoft Intellimouse™
Microsoft Windows NT Workstation
Intel LANDesk Client Manager
5-year/3-year Micron Power limited warranty

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Configurations

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STANDARD FEATURES
512KB pipeline burst cache, flash BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
24X variable speed EIDE CD-ROM drive
32 voice wavetable stereo sound with speakers
USR Sportster 56K x2 data/fax modem*
PCI 64-bit 3D video, MPEG, 4MB EDO DRAM
Microsoft® IntelliMouse™, USB connections
Microsoft Windows® 95 and MS® Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
5-year/3 year Micron Power℠ limited warranty

Millennia MME 166

Intel 166MHz Pentium® processor with MMX™ technology
32MB SDRAM
3.2GB Ultra ATA hard drive
15" Micron 500FGx, .28dp (13.7" display)

$1,599
Bus. Lease $55/mo.

Millennia MME 200

Intel 200MHz Pentium processor with MMX technology
64MB SDRAM
4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,099
Bus. Lease $72/mo.

Millennia MME 233

Intel 233MHz Pentium processor with MMX technology
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,299
Bus. Lease $79/mo.

Micron Software Solutions Paks

Quicken Financial Pak: Quicken Deluxe, Family Lawyer, Parent's Guide to Money, Financial Planner†

EdVenture Pak: Comprised of exciting children's educational and entertainment titles. Call for current list of titles.†

Home Productivity Pak: Creative Multimedia's Family Doctor, Comptons Interactive Encyclopedia, Mindscape's Mavis Beacon Teaches Typing, Broderbund's PrintShop Ensemble III, Net Nanny, Crayola's Magic 3D Coloring Book†

Arcade Pak: X-wing vs. Tie Fighter, Need 4 Speed 2, Command and Conquer Red Alert, Thrustmaster Game Pad†

Millennia XKU

STANDARD FEATURES
82440LX chip set
512KB internal L2 cashe, 2MB BIOS
Integrated 100MB lomega Zip drive, 3.5" floppy drive
24X EIDE variable speed CD-ROM drive
32 voice wavetable stereo sound with Advent 009 speakers with subwoofer
USR Sportster 56K x2 data/fax modem*
Diamond Viper V330 128-bit 3D video with 4MB SGRAM
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
5-year/3 year Micron Power limited warranty

Millennia XKU 266

Intel 266MHz Pentium II processor (features MMX technology)
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,599
Bus. Lease $89/mo.

Millennia XKU 300

Intel 300MHz Pentium II processor (features MMX technology)
128MB SDRAM
8.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$3,099
Bus. Lease $106/mo.

Fusion 3D Option Pak

DVD-ROM, **DVD software
E4 Cool DVD PCI decoder card: 6 channel AC-3 to 2 channel out capability, SPDIF output (digital audio out)
AWE 64 ISA sound card
Cambridge SoundWorks/MicroWorks - 2 speaker satellite with subwoofer stereo system
Monster 3D graphics card with 4MB memory***
Fusion 3D game pak: Mech Warrior 2: Mercenaries D3D version, AH-64D Longbow, U.S. Navy Fighters '97, Command & Conquer, Formula 1 D3D Edition
MS Sidewinder™ Pro Joystick

MME add $699
XKU add $549

*Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.
**The CD ROM drive will be removed upon the purchase of the DVD upgrade
***Available only on Millennia MME system

MMX™ intel inside pentium® PROCESSOR

Portable Solutions

Micron TransPort™ VLX

166MHz Intel Pentium processor with MMX technology
16MB EDO RAM (40MB max.)
1.6GB hard drive
16X modular CD-ROM drive
Li-Ion battery
12.1" TFT SVGA, 800x600 display
256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed video-ready
Touchpad pointing device
Microphone and 16-bit stereo sound
2-way infrared port
Modular floppy drive
Microsoft Windows 95 and MS Plus!
5-year/1-year Micron limited warranty

$2,249
Bus. Lease $77/mo.

Micron TransPort XKE

STANDARD FEATURES
512KB pipeline burst cache
128-bit, 2MB DRAM graphics
20X modular CD-ROM drive with AutoPlay™ technology
Pick-a-Point dual pointing devices
Microphone and 16-bit stereo sound
Integrated 33.6 Kbps modem (upgradeable to 56Kbps), full duplex, CardBus- and zoomed video
2 infrared ports, S-video, NTSC, game and USB ports
Management and Executive Travel software pak
2 modular expansion bays
Dragon System NaturallySpeaking Personal voice recognition software
Custom nylon carrying case
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
5-year/3-year Micron Power limited warranty

Extended VLX Notebook Service Options

2nd and 3rd year parts and labor; 3-business-day turnaround for 3 years[4]	$269
2nd and 3rd year parts and labor; 7-business-day turnaround for 3 years[4]	$209

Micron TransPort XKE 166

166MHz Mobile Intel Pentium processor with MMX technology
32MB EDO RAM
1.6GB removable hard drive
12.1" TFT SVGA display

$3,899
Bus. Lease $133/mo.

Micron TransPort XKE 200

200MHz Mobile Intel Pentium processor with MMX technology
48MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

$4,899
Bus. Lease $167/mo.

TransPort Options

Micron Executive™ desktop package: matching black 17" monitor (15.8" display), mouse, mousepad and keyboard (can be used with or without MicronDock. Available on XKE models only.)	$599
Leather carrying case upgrade	$99

Micron TransPort XKE 233

233MHz Mobile Intel Pentium processor with MMX technology
48MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

$5,249
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STANDARD FEATURES
12/20X variable speed SCSI CD-ROM drive
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Supports multiple IDE Ultra ATA and Ultra-Wide SCSI-3 hard drives
DMI, software and hardware management support
Iomega Jaz SCSI drive with 1GB removable cartridge
Wavetable stereo sound with speakers
Fast Ethernet 10/100 PCI network adapter
Microsoft IntelliMouse
Microsoft Windows NT Workstation
19" Hitachi SuperScan CM751 (18" display) .26dp monitor
Optional support for dual monitors
5-year/3 year Micron Power limited warranty

Powerdigm XLI

Dual Intel 200MHz Pentium II processor
64MB ECC EDO RAM
Memory upgradable to 512MB ECC EDO RAM
Number Nine Revolution 3D video card, 4MB WRAM

$4,899
Bus. Lease $167/mo.

Powerdigm XSU

Samurai™ chip set
Dual Intel 300MHz Pentium II processors
64MB ECC SDRAM
Memory upgradable to 1GB ECC SDRAM
Fire GL 1000 pro 8MB 66MHz PCI Open GL Professional 3D accelerators

$6,199
Bus. Lease $195/mo.

Call our sales team today! Left to right: Felice, Brian, Fred, Justin, Bruce and Ron.

Other Systems Options

Multimedia Options

32 voice wavetable stereo sound card[1]	$59
32 voice wavetable stereo sound card with 2MB RAM[1]	$99
Advent AV270 Powered Partners stereo speakers	$79
Advent AV370 Powered Partners stereo speakers with subwoofer	$199
Microsoft SideWinder™ 3D Pro joystick	$59
Microsoft SideWinder gamepad	$39

Storage/Media Options

Adaptec 2940U Ultra SCSI Fast-20 controller (upgrade from system with standard Ultra SCSI Fast-20 controller)	$100
Plextor 12/20 Plex 3MB/sec SCSI internal CD-ROM drive[1] (upgrade from system with standard EIDE CD-ROM drive)	$100
Iomega Jaz SCSI drive with 1GB removable cartridge[1]	$299
Iomega Zip IDE drive with 100MB removable cartridge	$99
Iomega 6-pack of 100MB Zip cartridges	$99
Sony 4/8GB SCSI DDS-2 tape backup drive with tape and software[1]	$899
Cheyenne ARCserver with InocuLAN	$499

Display/Video Options

17" Hitachi SuperScan CM630 (15.9" display) .26dp color monitor[2]	$100
19" Hitachi SuperScan CM751 (18" display) .26dp color monitor[2]	$300
21" Hitachi SuperScan CM801 (20.0" display) .26dp color monitor[2]	$650
Number Nine Imagine 128 series II video card, 4MB VRAM	$299
Number Nine Imagine 128 series II video card, 8MB VRAM	$549

Printer Options

HP DeskJet 692C	$269
HP DeskJet 890Cxi	$429
HP LaserJet 6Lxi	$399
Lexmark 2030 Color Jetprinter	$179
Lexmark 7200 Color Jetprinter	$399
Lexmark Optra E+ Laser printer	$399
Epson Stylus Color 600	$269
Epson Stylus Color 800	$399
Canon BJC - 80	$299
Canon BJC -250	$149
Canon BJC - 4300	$199
10ft. IEEE-1284 Printer Cable	$ 16

Communication Options

33.6 external data/fax modem	$299
56Kbps technology modem* upgrade	$99

Server Extended Service Options

2nd and 3rd year next-business-day[5] on-site service coverage[4]	$99
4-hour response[6] on-site service coverage[4] (8am - 5pm, M-F), 3 year	$798
4-hour response[6] on-site service coverage[4] (24 hours, 7 days per week), 3 year	$998
Other service options may be available, ask your system consultant	

Extended Desktop Service Options

Optional 1st year on-site service[3] coverage included	
2nd year on-site service[4] coverage	$79
2nd and 3rd year on-site service[4] coverage	$99
Other service options may be available, ask your system consultant	

Software Options

Small Business Essentials: QuickBooks, Visio, Norton AntiVirus, Astound, Focal Point, American Yellow Pages	$179
CorelDRAW 7 (full retail version)	$299
Corel WebMaster Suite (full retail version)	$99

Network Options

3Com 3C509B Etherlink III ISA combo network adapter	$79
3Com 3C905 EtherlinkXL PCI combo network adapter	$99
3Com OfficeConnect Hub 8/TCP	$149
3Com OfficeConnect Switch 140	$969

Other Options

APC Per7T surge suppressor	$39
APC Pro7T surge suppressor	$59
Microsoft Natural Keyboard (upgrade from standard keyboard)	$49

[1] Requires SCSI host adapter
[2] Upgrade from systems with standard Micron 17" 17FGx color monitor
[3] 1st year on-site service is available in the United States and in limited areas in Canada from third-party service provider per customer's agreement with provider
[4] 2nd year and 2nd and 3rd year offerings are available in the United States only. Extended services, if purchased after system shipment may have a higher cost.
[5] Service will be scheduled whenever possible, for the next business day after parts are received by the customer
[6] Available in certain locations, ask your system consultant for details
Some options and accessories available with system purchase only

*Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

†Available only on Millennia systems with Microsoft Windows 95

MICRON POWER™ WARRANTY

5-year limited warranty on microprocessor and main memory
3-year limited parts-only system warranty (1-year for TransPort VLx)
1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
30-day money back policy
24-hour technical support

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MICRON ELECTRONICS™
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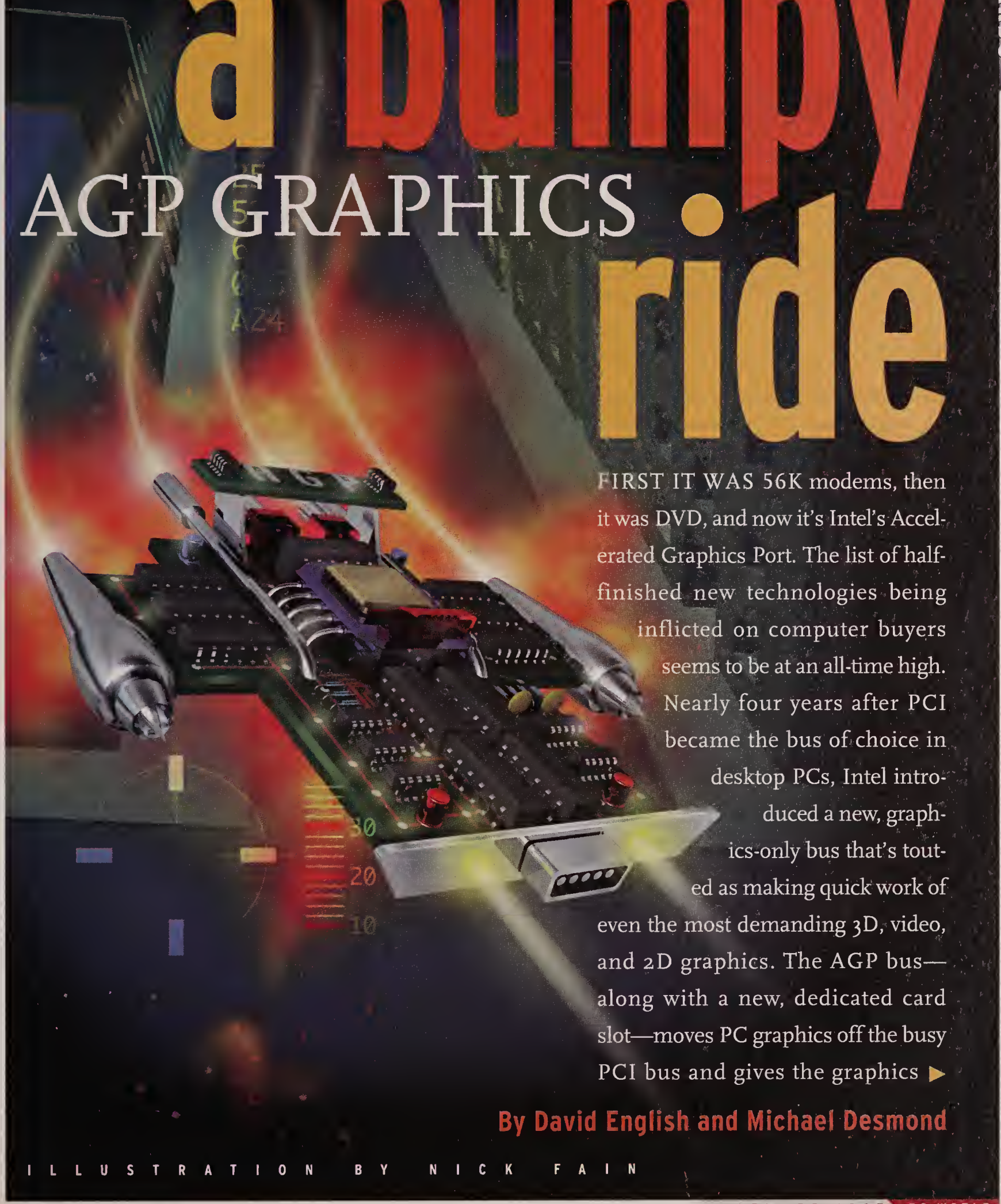
Fasten your seat belts. *Intel's new graphics bus may promise faster performance and realistic 3D, but our tests of the first AGP graphics cards reveal that the trip could be anything but smooth.*

a bumpy ride

AGP GRAPHICS



FIRST IT WAS 56K modems, then it was DVD, and now it's Intel's Accelerated Graphics Port. The list of half-finished new technologies being inflicted on computer buyers seems to be at an all-time high. Nearly four years after PCI became the bus of choice in desktop PCs, Intel introduced a new, graphics-only bus that's touted as making quick work of even the most demanding 3D, video, and 2D graphics. The AGP bus—along with a new, dedicated card slot—moves PC graphics off the busy PCI bus and gives the graphics ▶

By David English and Michael Desmond

ILLUSTRATION BY NICK FAIN

data its own fast lane to the processor. There's just one problem: The new bus may do a better job of confusing buyers than it does of speeding up 2D and 3D graphics operations.

Why did Intel go to the trouble of crafting a new connection? In a word, 3D. AGP can provide a significant benefit to 3D games, titles, and applications that have been designed to exploit its features, letting them deliver greater realism by providing access to fuller scene graphics. The new bus also promises to shortcut increasing demands on the existing PCI bus, now that everything from network adapters to sound boards are beginning to share bandwidth with graphics cards.

NOT FOR EVERY PC

BUT DON'T RUSH OUT and buy an AGP graphics card just yet. To take advantage of the new technology, your system must be equipped with an AGP bus slot—something that began appearing in Pentium II systems sold only since September—or it must have AGP graphics integrated on the motherboard. The secret ingredients: Intel's new 440LX chip set and Microsoft's Windows 95 OEM Service Release 2.1. The 440LX not only adds AGP, it also introduces fast SDRAM memory to Pentium II PCs, providing a boost over the EDO DRAM found in 440FX-based Pentium II systems. All new Pentium II PCs shipped with Windows 95 should have the OSR 2.1 version of the operating system. Be sure to check that OSR 2.1 also came with the USB supplement, which includes a 32-bit device driver that adds AGP support to the operating system (not all Pentium IIs include the supplement).

Because the hardware requirements severely limit the number of PCs that can be upgraded to AGP, graphics board vendors have little incentive to ship retail AGP cards immediately. So you can expect to wait another four to six months before finding a wide selection in stores.

To see if this new graphics bus could really deliver faster performance and more realistic 3D graphics, we tested five of the first shipping AGP boards. Our findings: Although AGP cards can improve the visual detail of software that's optimized for it, we saw little, if any, impact on today's popular software. Graphics-intensive 2D applications like PowerPoint, as well as demanding video-playback operations, do not get a noticeable performance boost on the new bus, and even AGP-enhanced games run at about the same speed.

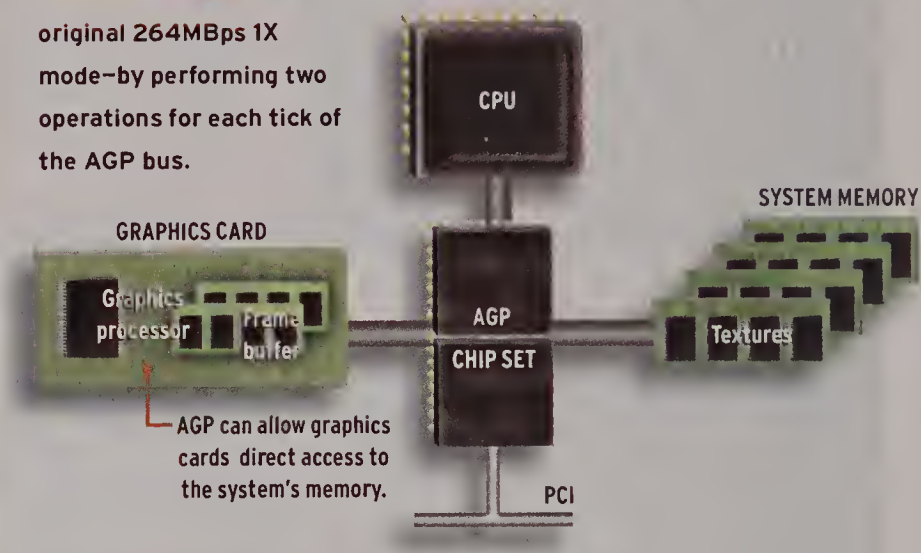
More important, we found that not all AGP graphics cards provide the same features. It turns out that some boards lack the key texturing feature that lets AGP improve the performance and visual detail of AGP-enhanced 3D software. The reason: Intel's definition of AGP does not require board vendors to support most of its features.

Right now, AGP-enhanced software is as scarce as cheap housing in San Francisco. Hopefully, by the second half of 1998 heavy-duty graphics users will find lots of games and a few 3D design applications—including Caligari's TrueSpace and Virtus's

AGP à la Carte

NOT ALL CARDS take advantage of AGP's features like AGP texturing and pipelining. That leads to big differences in the quality of game scenes when running AGP-optimized software. Here are four features to look for.

Feature 1 **AGP 2X mode:** The 2X mode can move data at 528MBps—twice as fast as the original 264MBps 1X mode—by performing two operations for each tick of the AGP bus.



How AGP works AGP promotes your graphics card in the PC's data food chain. It creates a new connection between the graphics card and system memory, so graphics data no longer travels on the busy PCI bus. The 66-MHz bus—twice the speed of the PCI's—provides fast access to RAM for displaying realistic 3D graphics.

RECOMMENDED

THE ATI Xpert@Work supports the hot AGP features.

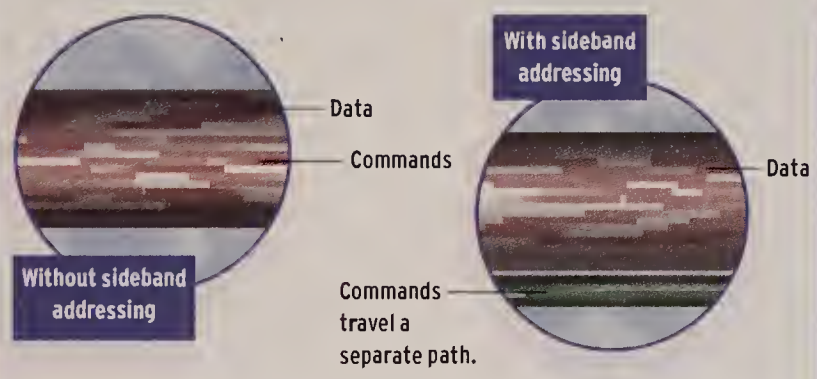
NOT ALL AGP boards are created equal, as we found out in our tests with AGP-optimized software. Though all five boards performed ably in a variety of 2D, video, and non-AGP-optimized 3D tasks, we found that two boards could not display AGP-enhanced scenes in our Psygnosis G-Police game tests.

The best of the bunch is the ATI Xpert@Work, the only AGP 2X board in our roundup. It excelled in our PC WorldBench tests and provided consistently high frame rates running G-Police. The Diamond Viper also performed very well but was not as fast as the ATI in our PC WorldBench test.

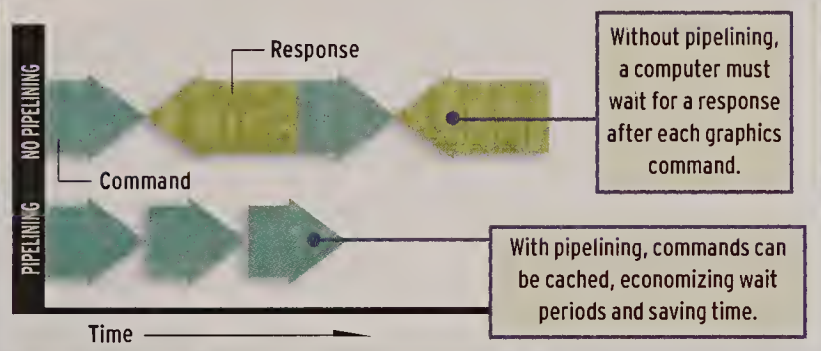
Frankly, we were surprised to find key AGP features missing from some of the boards we reviewed, so the burden clearly falls on the buyer to make sure the expected features are present in a product. If you want AGP for its 3D potential, for example, ask specifically about AGP texturing support in the graphics card. You may even want to wait until mid-1998, when the first truly AGP-optimized graphics chip sets are expected to roll out.

PHOTOGRAPH: KEN SMITH; PHOTOCOMPOSITION: NICK FAIN

Feature 2 **Sideband addressing:** Cards with this feature provide a separate path for sending and receiving command data, freeing up the data path to achieve top throughput.



Feature 3 **Pipelining:** Get a card with pipelining. It reduces downtime by letting the graphics card issue many commands without the AGP card first waiting for a response.



Non-AGP-enhanced scene

Feature 4 **AGP texturing:** Also called Direct Memory Execute mode, AGP texturing provides much greater realism by letting AGP graphics cards use large amounts of your computer's system memory to build 3D graphics.

AGP-enhanced scene

ConceptCAD—that take advantage of AGP's unique talents.

The five boards we tested all boast 3D-capable graphics chips and represent some of the latest graphics technology. We looked at OEM versions of the ATI Xpert@Work, Diamond Viper V330, Matrox Millennium II AGP, Number Nine Revolution 3D, and STB Velocity 128 AGP boards. To compare the performance of these AGP products, we also tested the PCI versions of the same cards. Because the AGP boards are currently available only as part of a new PC, we were unable to select a Best Buy but do recommend one board: the ATI Xpert@Work.

IS AGP REALLY FASTER THAN PCI?

IF YOU WANT TO REPLACE your PCI graphics adapter with an AGP board just to speed up your everyday work, it won't happen—at least, not with the typical Windows business applications that are available today. We tested the five cards on an AGP-equipped Dell Dimension XPS D266 Pentium II computer. We put both the AGP and PCI boards through a battery of business- and multimedia-application tests, including 2D graphics, video playback, and 3D games. The result? Performance that was virtually indistinguishable between the PCI and the AGP versions of these products. For example, the PC WorldBench scores delivered by the AGP and PCI versions of four cards were within a single point of one another—an insignificant difference.

Our video test, which plays back a high-resolution MPEG-2 video clip, failed to show any speed advantage for AGP. The one exception: The STB Velocity 128 AGP eked out 3 more frames per second than its PCI sibling, which was already pushing out a very nice 30 fps. Even our test of a non-AGP version of the Psygnosis game G-Police showed no difference for most cards.

So what's going on here? Peter Glaskowsky, senior analyst at *Microprocessor Report,* says AGP has nothing to offer current non-AGP-enhanced 3D software. "The kinds of polygon counts [a measure of 3D quality] that we're dealing with today are within what PCI can generally transfer." In other words, there isn't a problem AGP needs to solve. Most graphics and video operations don't use up the ample bandwidth provided by today's PCI cards. The effect is similar to that of adding lanes to an underused freeway. The extra lanes won't get drivers to their destinations any faster, because they are already able to drive as fast as they please.

That said, some PCs may benefit from the new bus, Glaskowsky adds. The traffic created by PCI peripherals such as SCSI hard disk adapters and PCI audio cards can limit the bandwidth available to graphics on these systems.

Another reason for the parity of AGP and PCI is that vendors use the same graphics chip for both the PCI and the AGP versions of their cards. In fact, we saw much greater differences among product lines in our tests than we did between different bus versions of the same product. ▶

DESKPRO	2000	4000	6000
Processor	166MHz Pentium® Processor with MMX™ technology	200MHz Pentium Processor with MMX technology	300MHz Pentium II Processor
Standard Memory	16MB SDRAM	32MB SDRAM	64MB ECC SDRAM
Hard Drive	2.1GB SMART	3.2GB Ultra ATA	4.3GB SMART ULTRA SCSI
Standard Cache/Max	256KB/512KB	512KB/512KB	512KB/512KB
Video Graphics	S3 Trio V2/GX	S3 ViRGE/GX	Matrox Millennium II (AGP)
Video Memory/Max	1MB/2MB SGRAM	2MB/4MB SGRAM	4MB/16MB WRAM
Expansion Slots/Drive Bays	5/5 Desktop	5/4 Desktop	5/4 Desktop
Ports: Serial/Parallel/USB	1/1 ECP/2	2/1 ECP/2	2/1 ECP/2
Intelligent Manageability	Yes	Yes	Yes
CD-ROM	Optional	Optional	24X with Sound
Software Pre-installed	Windows 95	Windows 95	Windows NT for Workstation
Limited Warranty*	3-Year	3-Year	3-Year
Compaq Monitor	V50 15" (13.77" viewable)	V50 15" (13.77" viewable)	V50 15" (13.77" viewable)
Price† Monitor included	**$1,399**	**$1,669**	**$3,859**

*Compaq Deskpro is covered by a Three-Year Limited Warranty. Monitors and certain options are covered by a One-Year Limited Warranty. Restrictions and exclusions apply. †All prices shown are Compaq DirectPlus prices. Reseller prices may vary. Offer available in the U.S. only. ©1997 Compaq Computer Corporation. All rights reserved. Compaq and Deskpro registered U.S. Patent and Trademark Office. Products, prices and programs are subject to change without notice. Windows and Windows NT are registered trademarks of Microsoft Corporation. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Other products are trademarks of their respective companies.

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AGP 3D: IT'S NOT THE SPEED, IT'S THE LOOK

OKAY, SO AGP may not speed up your existing software. What about games and applications that use AGP-enhanced 3D graphics? In most cases, AGP lets you run heavily textured games with realistic 3D scenes that bring PCI to its knees.

To confirm this point, we tested the AGP and PCI versions of the same five cards using a synthetic benchmark called Final Reality, which was developed by VNU Labs based on a game engine from Remedy Entertainment. The test used 16MB of textures to create complex 3D scenes, large enough to force all our graphics cards to use the PC's main memory to store texture data. The result? The PCI board—and the AGP cards that do not support texturing—ground down to about 1 scene per second. The AGP cards that do support texturing had high scene rates, averaging more than 66 sps.

Running our AGP-enhanced version of G-Police, frame rates were nearly identical between the AGP and PCI boards. Like any well-designed AGP game, G-Police automatically switches from heavy texturing for AGP boards to lighter texturing for PCI boards. So no change in speed—just a change in scene quality.

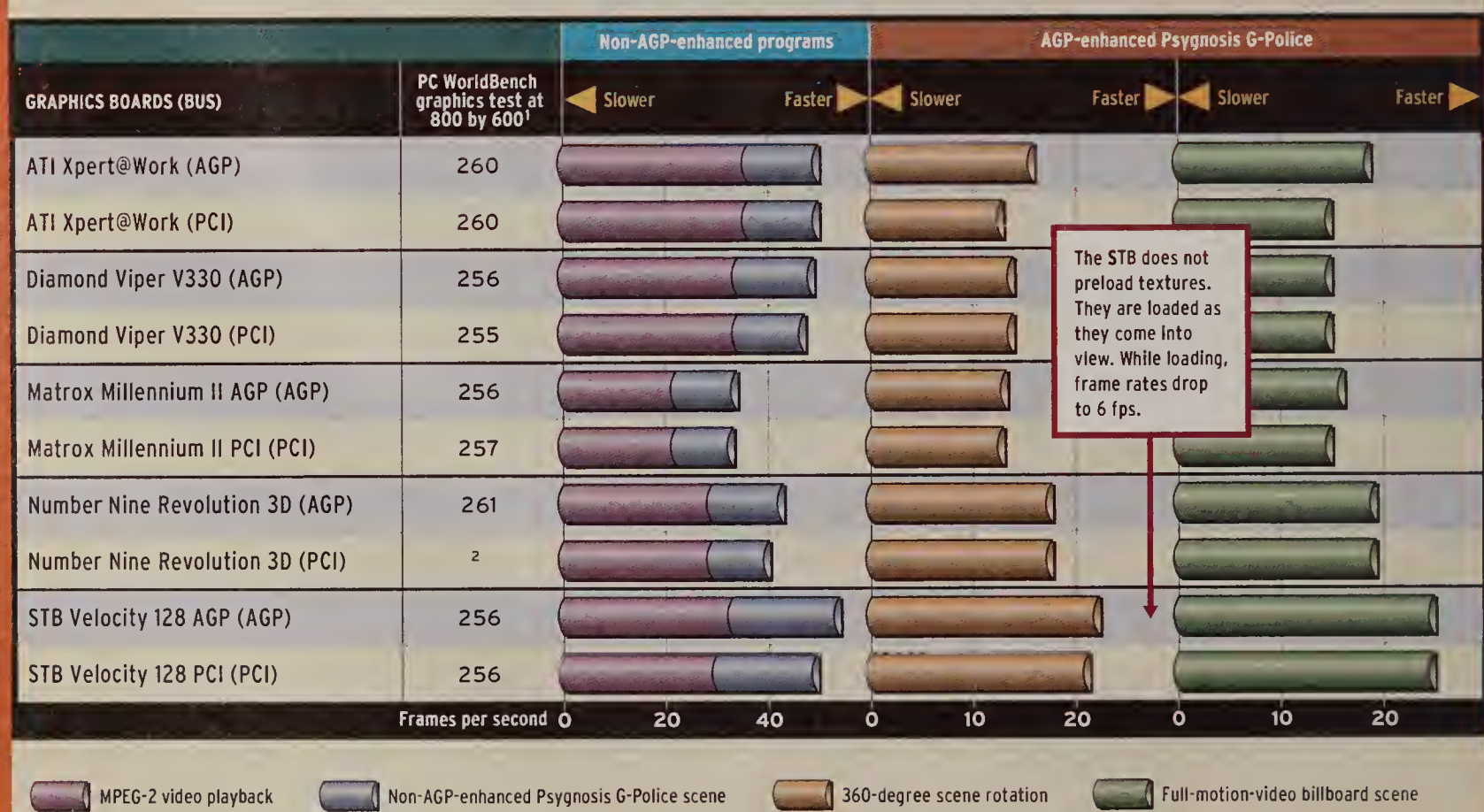
In fact, AGP promises to rid the world of ugly, oversimplified 3D scenes in PC software. Running the same game—one AGP enhanced, the other not—we saw some impressive improvements in visual detail. In hands-on tests using an AGP-enhanced version of G-Police, we noticed that explosions lost the distracting blockiness around the edges that we saw in the PCI version, and static billboards turned into flashy signs with full-motion video. Behind the improvement: the AGP bus's ability to feed 3D object data to the graphics card's processor several times faster than the PCI bus can.

Better scenes, however, do not always mean smooth game play. The STP Velocity board we tested had the fastest frame rates when running the AGP version of G-Police—except when it displayed heavily textured scenes. Each time one of these scenes launched on screen, there would be an annoying ▶

TEST REPORT

AGP Has Little to Offer Today's Apps

BASED ON OUR EARLY TESTS, AGP is not going to speed up your current programs. When we ran PC WorldBench (which uses common business apps), an MPEG-2 video clip, and a non-AGP version of the 3D game Psygnosis G-Police, we found almost no speed differences between PCI and AGP cards. With the exception of the ATI Xpert@Work (the only 2X AGP board we reviewed), our tests on an AGP version of G-Police produced the same results. But in heavily textured scenes, G-Police looked significantly better with the boards that support AGP texturing (ATI, Diamond, and STB).



[1]We ran PC WorldBench at three resolutions but report only 800 by 600, which showed the greatest differences. Higher scores are better. [2]Could not complete test.

HOW WE TEST All tests were performed under Windows 95 on a Dell Dimension XPS D266 Pentium II PC with 64MB of SDRAM. We ran PC WorldBench 1.0 at 800 by 600, 1024 by 768, and 1280 by 1024 resolutions. For our non-AGP multimedia tests, we used the Mediamatics MPEG-2 player software to run a 30MB MPEG-2 video screen saver from Interactual Technologies called Star Trek: First Contact. We unsynched the audio so that the system would play as many frames per second as possible. Our 3D test was an automated scene in Psygnosis G-Police, which has a built-in frame counter to gauge frame rates. (For those applications that use DirectX, we used the version provided with the board.) The AGP-enhanced version of G-Police automatically switches from heavy texturing for AGP graphics boards to lighter texturing for PCI boards, so that the game will run with PCI at acceptable frame rates.

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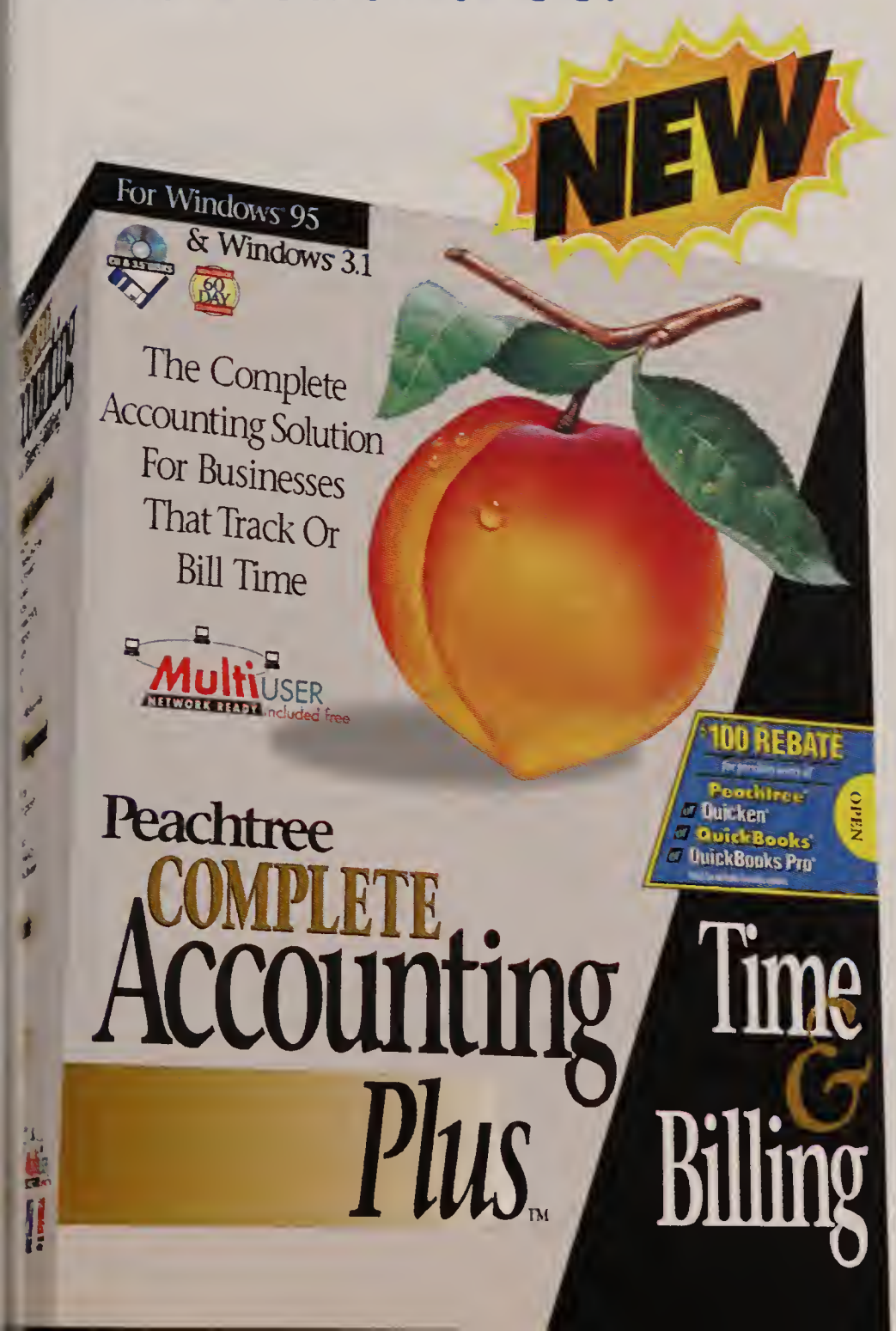

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Circle 175 on reader service card

delay while the game loaded the textures into the scene.

Surprisingly, two of the AGP boards we tested—the Number Nine Revolution 3D and the Matrox Millennium II AGP—fared just as poorly as the PCI boards, both visually with the AGP-enhanced G-Police test and in performance with the Final Reality benchmark test. Both boards displayed the same light texturing the PCI boards did when running G-Police. The Millennium displayed just 1 sps in the Final Reality benchmark, while the Revolution 3D choked out 1.6 sps. In both cases, the scene rates were essentially unchanged from those of their PCI counterparts.

BOTH STB's Velocity and Diamond's Viper have AGP texturing.

We discovered that both the Revolution 3D and the Millennium II boards lack support for AGP texturing, which the other three cards possess. So while these two boards are running on a 66-MHz bus, they perform like PCI graphics cards on a 33-MHz bus. When our benchmark test called on the cards to pull texture data directly from system memory, the data first had to be copied to the graphics frame buffer in a time-consuming two-stage operation.

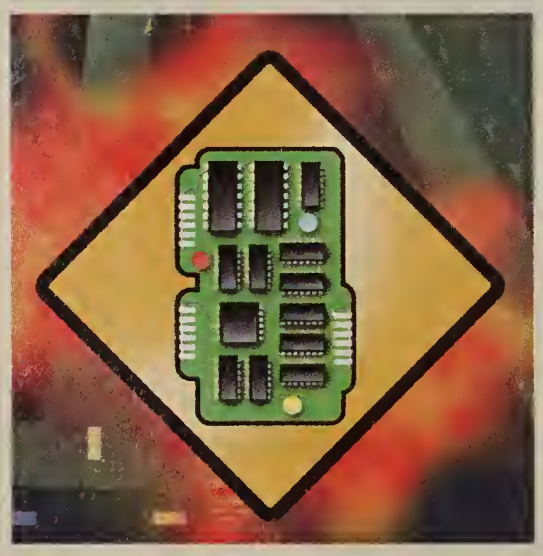
Both Matrox and Number Nine point out that their AGP graphics cards are designed for a business audience using 2D applications, not those interested in heavy-duty game play and 3D animation. But the bigger question is, How can cards that legitimately claim to be AGP compliant lack its most critical feature?

Ask Intel. Explains Jim Nucci, Intel AGP marketing manager: "Any graphics card that plugs into the AGP connector is considered AGP whether it's the 1X mode, 2X mode, still using the PCI protocol, or having the high-performance features designed in. From Intel's perspective, it's all AGP." In other words, when Intel developed AGP, it did not make AGP texturing a requirement for AGP graphics cards.

TEXTURES AND TROUBLE

IT TURNS OUT that four different AGP features can be left out of a card, and it can still be called "compliant." The most visible feature is the AGP 1X versus AGP 2X specification. Where 1X runs at 66 MHz and provides 264 megabytes per second of band- ▶

Proceed With Caution



WHEN IT COMES to buying PC hardware and software, conventional wisdom says never to buy version 1 of anything. Of course, we never follow that advice. Here are some tips on how to protect yourself if you are buying a new AGP graphics card.

Making the right choice. First, make sure you know what you are buying. If a system or graphics-board vendor says it provides AGP graphics for enhanced 3D performance, don't assume that the graphics card actually supports the most important new features, like AGP texturing and sideband addressing. If you want to take advantage of AGP's advanced 3D-handling capabilities, AGP texturing is by far the most important feature. But be careful: Not all system and board companies use the same terminology to discuss the texturing features of their products. You can look for a few key phrases, however. If a board vendor says that it supports AGP texturing, Direct Memory Execution, or execute mode, you can feel relatively assured that the product will be able to enhance AGP-optimized games and software.

If you want to get the most performance out of your AGP hardware, make sure the board you buy supports AGP's data streamlining tweaks. Look for mentions of sideband addressing and pipelining—both features can really help speed texture data between system memory and your graphics board. Also, look for an AGP board that supports 2X mode. Our tests on an AGP version of Psygnosis G-Police showed a slight performance advantage for the one AGP 2X board we evaluated—ATI Xpert@Work. The 2X's faster data rate could provide an advantage down the road, when games provide 32MB or more of texture data for scenes.

AGP PCs. When buying an AGP-capable desktop system, avoid products that put the AGP graphics chip directly on the motherboard. Some of these systems may not be able to accept future upgrades to AGP cards with improved graphics chip sets. How will you know? Before you purchase a system, ask the sales representative if AGP graphics is provided as an add-in card or in the motherboard, and then get the model names of the board and chip used in the graphics subsystem.

Keep in mind that AGP is a new and confusing technology, and that sales representatives may not be able to provide all the answers you need. If you get precise information about the graphics hardware, you can double-check with the graphics hardware company itself. —M. D.

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"Most users *are potentially going to be disappointed by what they get out of first-generation* cards, motherboards, *and software.*

PETER GLASKOWSKY senior analyst, ***Microprocessor Report***

width, 2X cards are able to double that bandwidth, providing a data path that carries 528MBps. The 2X cards can push more data over the 66-MHz connection by executing two operations for each tick of the AGP clock.

It sounds good, and it may be in the future. Our tests with the AGP-enhanced version of G-Police showed only a small increase in frame rates. The ATI Xpert@Work was the lone AGP 2X board in our group. Unlike results for the four 1X boards, G-Police ran slightly faster on the AGP board than it did on PCI. All of the 1X boards showed little or no change in frame rates between AGP and PCI.

A more important feature, at least for AGP-enhanced 3D games and software, is AGP *texturing*, also called Direct Memory Execute mode by Intel. This is the feature that lets AGP graphics cards pull 3D texture data straight from system RAM, allowing 3D scenes in future games to incorporate megabytes of data to achieve enhanced realism. As mentioned above, two of the five AGP cards lacked this critical feature and, when running the AGP-enhanced version of G-Police, showed the same lightly textured scenes as the PCI boards.

Two other features round out the AGP shell game. *Sideband addressing* speeds up AGP data transfers by taking the address and command instructions off the data pipe and sending them instead along a sideband to the system chip set. This data frontage road on the AGP freeway makes additional AGP bandwidth available for moving graphics data.

Likewise, *pipelining* squeezes more efficiency out of AGP command traffic. Normally, the graphics card issues a command and then waits until it receives an answer before issuing the next command—in effect, the board spends a lot of time waiting at red lights. AGP's pipelining feature lets the board issue multiple commands in rapid succession without waiting for a response—the lights are timed to let AGP commands run uninterrupted.

The challenge for buyers is that any one of these four features may or may not be present in the AGP graphics card they get with their systems. One graphics card may be 1X compliant and still offer AGP texturing, sideband addressing, and pipelining, while the 2X card in the system next to it may lack the other three features. And as far as Intel is concerned, it doesn't matter—all are considered AGP.

Why did Intel allow such a confusing variety of features? To ensure there would be products for the new bus slots. "They were worried that most vendors wouldn't be able to provide 2X graphics chips, and they were correct," says Glaskowsky. "The pipelining, the sideband addressing—those are difficult things to do."

There's more. Next year, Intel expects to release an AGP 4X mode, which will boost available bandwidth to 1 gigabyte per second or greater. While Intel won't discuss details, Glaskowsky says that the AGP 4X clock will run at 133 MHz, double the current rate, while the graphics cards will perform two operations for each clock tick. Don't count on upgrading your current AGP sys-

PHOTOGRAPH: BOB HOLMGREN

AGP GRAPHICS BOARDS FEATURES COMPARISON

	BASICS				AGP FEATURES			
BOARDS	Graphics chip	Installed/maximum video RAM	Video RAM type	Maximum refresh rate (Hz) at 1024 by 76B	AGP version	AGP texturing	Sideband addressing	Pipelining
ATI Xpert@Work 905/882-2600 ext. 1 www.atitech.com	ATI 3D Rage Pro	4/8	SGRAM	120	2X	●	●	●
Diamond Viper V330 800/468-5846 www.diamondmm.com	NVidia Riva128	4/4	SGRAM	120	1X	●	○	●
Matrox Millennium II AGP 800/361-1408 www.matrox.com/mga	Matrox MGA-2164WA	4/16	WRAM	140	1X	○	○	○
Number Nine Revolution 3D 800/438-6463 www.nine.com	Number Nine Ticket to Ride	4/16	WRAM	150	1X	○	○	○
STB Velocity 128 AGP 888/234-8750 www.stb.com	NVidia Riva128	4/4	SGRAM	120	1X	●	●	●

● Yes ○ No

tem with a 4X card, though—it probably won't be possible.

"Because the signal levels will be different, 4X will not work with anything you buy in the previous AGP implementations," says John Latta, an industry analyst with the *Wave Report*.

Unless you shop very carefully, you could end up with a graphics card that fails to provide a meaningful improvement over current PCI graphics, even when it is running AGP-optimized software. "Most users are potentially going to be disappointed by what they get out of first-generation cards, motherboards, and software," says Glaskowsky.

SHOW ME THE SOFTWARE!

OF COURSE, AGP's new features aren't worth much without software that takes advantage of them. "There's one problem with AGP, and that is, where are the applications?" asks Amid Rahmat, senior analyst at PC graphics research firm Jon Peddie Associates. "At the end of the day, it is all based on where the applications are and where the operating system is."

Microsoft is scheduled to build AGP support directly into the Windows 98 operating system; however, that upgrade has been delayed until April or May. In the meantime, AGP graphics cards must have the 32-bit device driver installed before Windows 95 will recognize them. (As we mentioned earlier, you need to make sure the driver comes with the OSR 2.1 version of Windows 95.) Users will also have to install version 5 of Microsoft's DirectX—a suite of multimedia operating system components and device drivers—to enable AGP's 3D features.

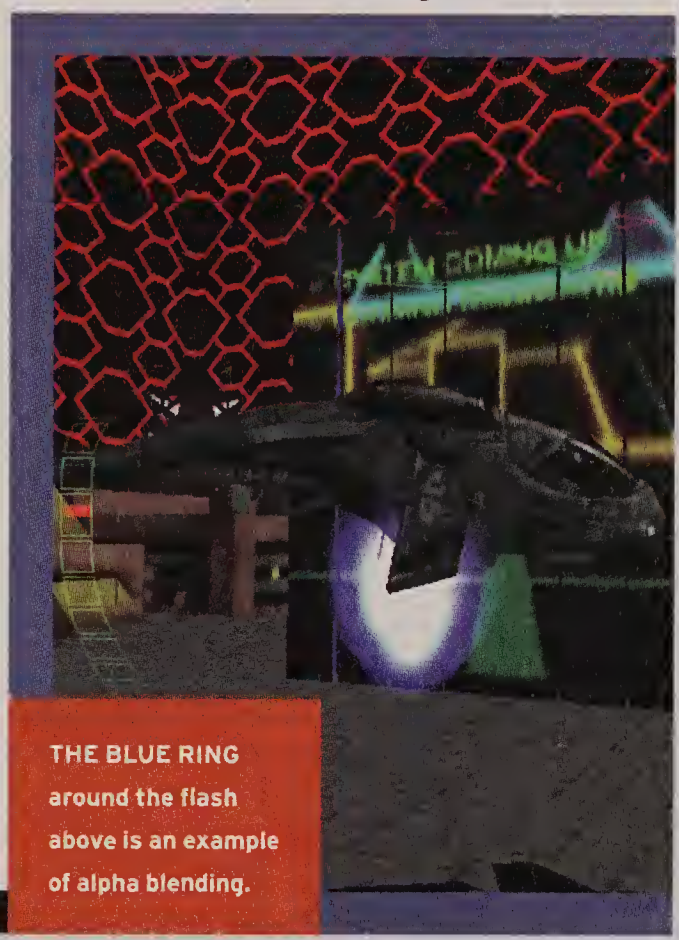
Many graphics board vendors will struggle for a while with incorporating support for AGP in their products. "You have to bear in mind that the chip vendors have their own time lines," says Jon Peddie's Rahmat. "It's going to settle down, but it won't settle down until next year. It'll take the chip vendors and the board vendors another three to six months to start figuring out the chip issues and the driver issues."

On the software side, you can expect a lot of programs to add partial support for AGP texturing in the near future—or at least those features that are easy to implement, such as adding AGP texturing to individual objects rather than to entire scenes. Some game developers say that adding support for AGP texturing is not difficult, and many expect to provide downloadable patches on their Web sites that will add limited AGP support to some existing applications.

Still, like the Pentium MMX chip introduced in January 1997, AGP requires developers to add specific support in order to fully realize the performance advantage of the new technology. With software development cycles taking 6 to 12 months, it could be a year or more before a large number of AGP-enhanced titles show up on store shelves.

AGP TEXTURING: THE SECRET SAUCE

IN ORDER TO DISPLAY a realistic 3D environment, programs apply graphics images, called *textures*, onto the surfaces of the polygons that make up 3D shapes. Done properly, these textures are stitched together to form ▶



THE BLUE RING around the flash above is an example of alpha blending.

ture-mapped 3D objects look realistic from different angles.

3D filtering. Also called bilinear or trilinear filtering, 3D filtering eliminates blockiness in 3D images and textures by averaging the color data among adjacent pixels.

Fogging. Fogging blends a 3D object with a fixed color so it appears to fade away as it moves further from the viewer.

MIP mapping. Another ubiquitous feature, MIP mapping, stores several sizes of a texture-mapped image to best fit the bit map onto objects as they vary in size. MIP maps avoid blockiness when zooming in on texture-mapped images, and reduce the annoying sparkle caused when the graphics chip stretches or condenses a texture-mapped image to fit an object.

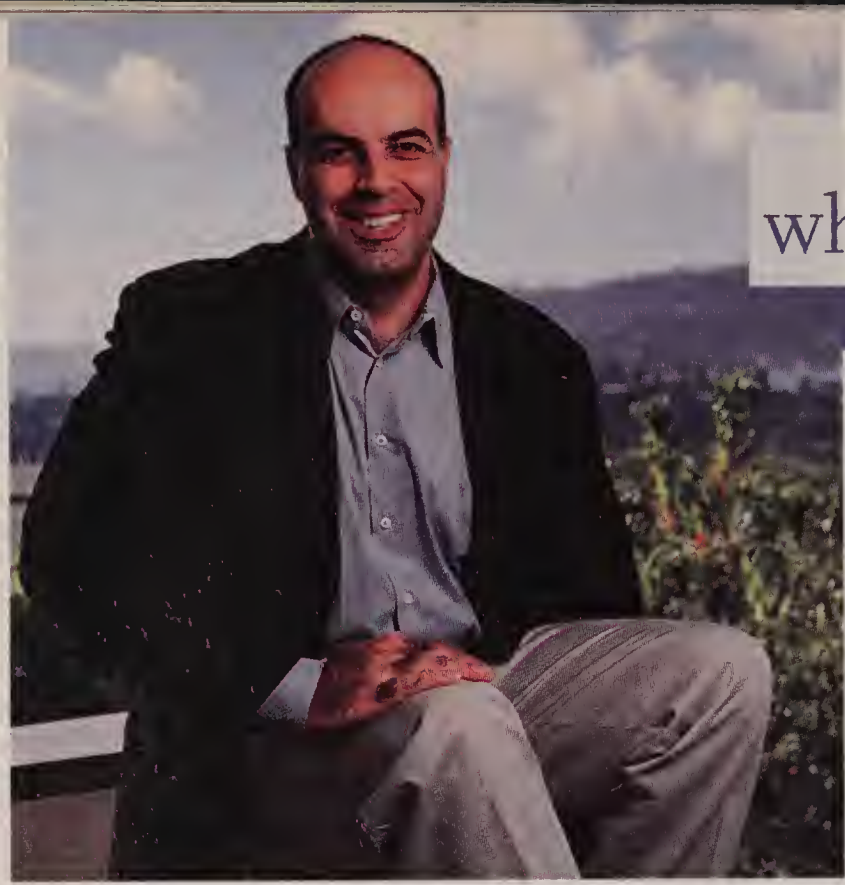
Alpha blending. This feature combines two overlapping texture maps to create the illusion of transparency, such as when looking through water.

3D FEATURES					SUPPORT
Perspective correction	3D filtering	Fogging	MIP mapping	Alpha blending	Warranty for parts/labor (years)
●	●	●	●	●	5/5
●	●	●	●	●	5/5
●	○	○	●	○	3/3
●	●	●	●	●	5/5
●	●	●	●	●	lifetime

3D SPEAK

The 3D graphics market is buried in obscure jargon, much of which is used to describe critical display features found in 3D graphics chips. Some examples follow.

Perspective correction. All five boards support perspective correction, which makes tex-



"There's one problem with AGP, and that is,

where are *the* applications?"

AMID RAHMAT senior analyst, Jon Peddie Associates

the illusion of real-world objects. The problem: Many megabytes of texture data are required to create great-looking scenes.

With most graphics cards packing 2MB, 4MB, or at most 8MB of graphics RAM, there is not much room for displaying texture data. On a 4MB PCI graphics card, for example, software developers can count on being able to use only about 2MB for texture data. And that figure goes down as your screen resolution goes up, since that 4MB on board is shared by both display graphics and stored 3D textures. So why not just put more memory on the video card? Well, you could, but it would be expensive—particularly when you consider that the extra video memory would be used by only a small number of 3D applications.

For those graphics cards that support AGP texturing, game programmers can use system memory as if it were dedicated texture memory located directly on the card. Games get instant access to 8MB, 16MB, or even more texture memory, depending on the amount of available system RAM. The only drawback, say some developers, is that it takes longer for data to move from main memory to the graphics card than it does from the card's onboard RAM, so some AGP-enhanced software may run slower.

Nevertheless, game makers are hot on this new technology because of the potential for fancier scenes. Access Software, maker of the Pandora Directive game, is developing its upcoming Tex Murphy: Overseer title with AGP in mind. The game places live-action digital video inside 3D-rendered rooms. On an AGP system, Access says, frame rates could double over those of PCI systems, from about 10 fps to 20 fps.

The AGP-optimized version of Tex Murphy: Overseer uses as much as 16MB of textures at a time. When played on a system with a PCI card, the program uses its own software to process texture data from system memory, through the CPU, and ▶

The 100-MHz PC

SO YOU'VE DECIDED to buy a new AGP-equipped Pentium II system. Don't jump too soon. Come spring, Intel plans to significantly improve the performance of Pentium II PCs by speeding up the motherboard from the typical 66 MHz to 100 MHz. The 50 percent boost is the first speed increase for Intel-based PC motherboards since the introduction of the 60-MHz and 66-MHz Pentium CPU in 1993, when the motherboard bus was boosted from 33 MHz. Unlike AGP, which mainly improves performance of 3D operations, the faster motherboard will enhance performance across all applications. You can expect to see Intel match its upcoming Deschutes processor (the slimmed down, .25-micron version of Pentium II running at 333 MHz and beyond) with the faster motherboards.

The payoff. So what do you get with a 100-MHz bus? Quicker CPU access to main memory, which will benefit virtually every application. Over the past several years, as Intel CPU speeds ramped up from the initial 60 MHz to a blistering 300 MHz, the rate at which data moved along the memory bus barely changed—it's still limited to a maximum of 66 MHz. To counteract the growing speed mismatch, vendors placed fast cache memory both inside and next to the CPU. The Pentium II, for instance, has 64K of superfast internal, primary cache, and another 512K of external, secondary cache that runs at half the processor's speed. But when the two levels of cache can't give the CPU the data it needs, it must call data from main memory along the 66-MHz bus.

Worth the wait? It may be, particularly if you use a lot of multimedia titles, DVD software, large database files—or any application in which the CPU must resort to quick cache memory. In fact, software-based playback of DVD video and audio really needs the faster access to work well, says Peter Glaskowsky, senior analyst at *Microprocessor Report*. "If you want to put a DVD player in your PC, I wouldn't get a current machine," warns Glaskowsky. He also notes that the AGP bus, which must compete with the CPU for access to main memory, will get a boost with the new motherboards since data can be accessed from memory at a higher rate.

What comes after 100 MHz? Nathan Brookwood, processor analyst for the research firm Dataquest, says that 100 MHz may be the limit for motherboard bus speeds. At higher frequencies, electromagnetic interference becomes difficult to manage—the motherboard, in effect, starts to act like a transmitter.

"I think we'll probably see solutions that go more to intrachip connections—the 'system on a chip' that everyone is talking about," says Brookwood. "If you can get rid of most of the interconnections between chips by moving everything onto one big piece of silicon, you have solved a lot of problems." —M. D.

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to the graphics board. The work-around allows Access to provide high levels of realism on existing PCI machines—but at a terrible cost in frame rates. Says Bruce Ward, an Access producer, "Now [with AGP] we can have Z-buffering, fast hardware transforms, and various other hardware functions that improve both the look and the speed of the rooms."

The enhanced version of Psygnosis' G-Police title is another example of how AGP helps games. On AGP systems with 32MB of memory, the game uses 8MB of texture data to create scenes. But on AGP systems with 64MB of system memory, the texture data bumps up to as high as 16MB. In other words, the more system memory you have, the better off you are. Other 3D games that will support AGP texturing include Acclaim's Forsaken, Rage Software's Incoming, Game Fx's Out of the Void, and Microsoft Baseball 3D.

BE SURE to check that your graphics card has 3D filtering. The feature reduced blockiness and smoothed lines in the image at top, especially in its background.

Games are not the only applications that will benefit from AGP's texture-handling talents; many vendors of 3D design applications plan to add AGP capability next year. An updated version of MetaCreations' Bryce landscape creation software should feature a full-size preview of rendered 3D scenes. Currently, the preview window is limited to a wire frame (augmented by a postage-stamp-size rendering). The company also says it will beef up the 3D user interface in some of its programs as AGP systems become more commonplace. Caligari's TrueSpace will offer improved AGP support, and Virtus's ConceptCAD will add it, which should give both applications faster and smoother rendering of high-resolution 3D scenes.

"Now [with AGP] we can have... **fast hardware** *transforms and other...functions that improve the* **look** *and* **speed** *of the [game's 3D-rendered] rooms."*

BRUCE WARD game producer, Access

INVESTMENT PROTECTION

IF AGP DOES SO LITTLE aside from enhanced 3D, why consider buying an AGP-equipped PC and graphics card at all? For one thing, Intel, Advanced Micro Devices, and Cyrix are all arranging for their chip sets to support the new bus, and system vendors such as Gateway 2000, Dell, and Compaq are beginning to incorporate it on their Pentium II PCs. AMD and Cyrix, however, cannot use Intel's proprietary slot 1 (the socket for the Pentium II processor package) for their own processors, so they will have to come up with alternatives to Intel's 440LX chip set.

With the probable success of the Pentium II, AGP will likely supplant PCI as the most popular graphics technology. By 1999, the market-research firm Mercury Research expects AGP graphics systems to outsell PCI graphics systems by more than two to one. That's certainly an incentive for application developers to add AGP to their software. AGP will also not add much to the price of a new PC. By the time you read this, both Dell and Gateway 2000 expect to be selling Pentium II-233s with AGP graphics cards for $1999. Notebooks with AGP cards should start turning up in the second quarter of next year, following the introduction of mobile Pentium II processors.

So should you move to AGP graphics now? If you don't need to upgrade your PC immediately, there is no compelling reason to rush out and buy an AGP-capable system and graphics board. In fact, if you can wait until the release of Windows 98—expected in several months—you will probably enjoy a smoother transition to AGP than you might otherwise. What's more, the graphics boards available in six months will be much more likely to support AGP's most useful features.

If you just can't wait to buy a Pentium II PC, and are running mostly business applications, you might be able to save yourself a bit of money. Assuming that the graphics board in your old PC is a PCI card and that it's working fine, try ordering your new PC without the graphics card and put your current PCI card in it instead. You can then pick up a better AGP card later if and when you need it.

Are you into games, or do you want to be the first on your block with the latest graphics? Make sure you purchase a board like the ATI Xpert@-Work or the Diamond Viper V330, both of which support the AGP texturing feature. On the other hand, if you simply happen to be running 2D applications on an AGP-capable system, any of the boards reviewed here perform like their PCI counterparts.

There are many questions surrounding AGP, and buyers should be asking them. "Ultimately, they are the people paying the money," says Glaskowsky, "and they need to make sure they know what they're getting."

David English is a freelance writer based in Greensboro, North Carolina. Michael Desmond is a senior associate editor at PC World. *Mike Salayko, performance analyst at the PC World Test Center, produced all AGP performance tests.* ■

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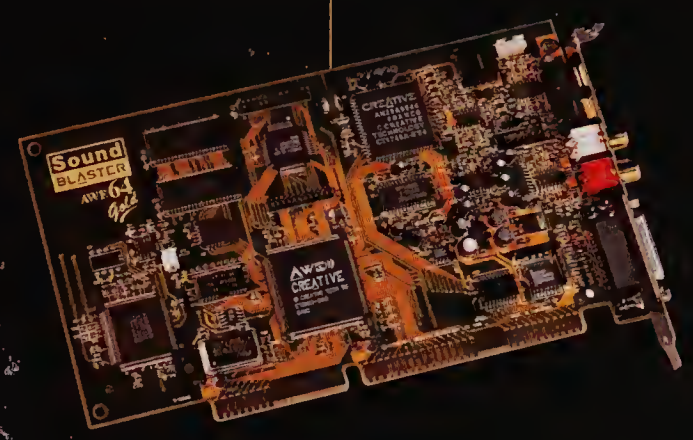

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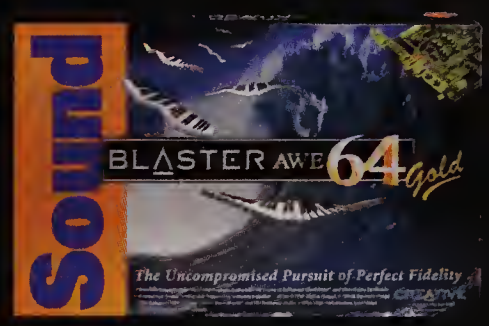

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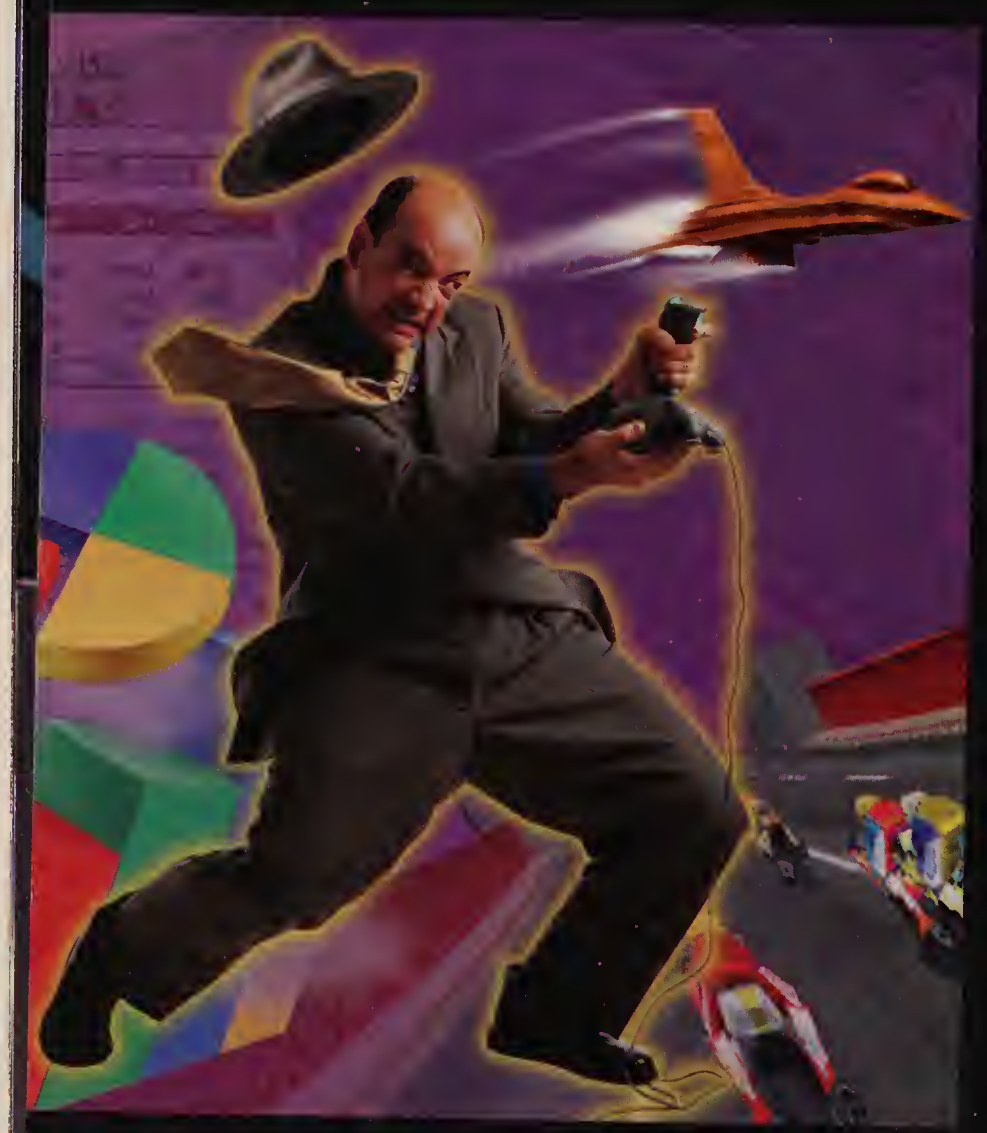

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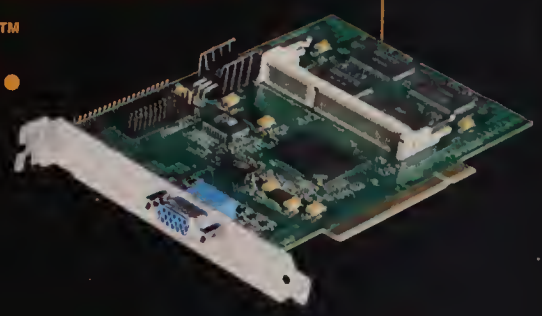

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From High-Rise to Home: How to Set Up a Small Office That Works

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EDITED BY
Angela Freeman
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NED

Ned knows he's on a flight to L.A. this afternoon.

AL

Al also knows he's on a flight to L.A. today. Flight #133, a Boeing 767 departing New York Kennedy at 4 p.m. out of Gate 46, scheduled to arrive into LAX at 7:11 p.m., Gate 45, Baggage Carousel 3. For his seating assignment, he's upgraded himself from 21A to 3A. And is looking forward to watching "Batman & Robin™" on video, which his wife refuses to see, even if it does have George Clooney. Al knows he'll earn 2,475 AAdvantage® travel awards program miles, leaving him just 530 shy of earning his next set of upgrade stickers, which he should pick up later this month. Attaboy, Al.

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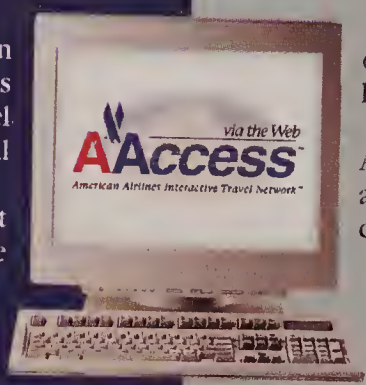

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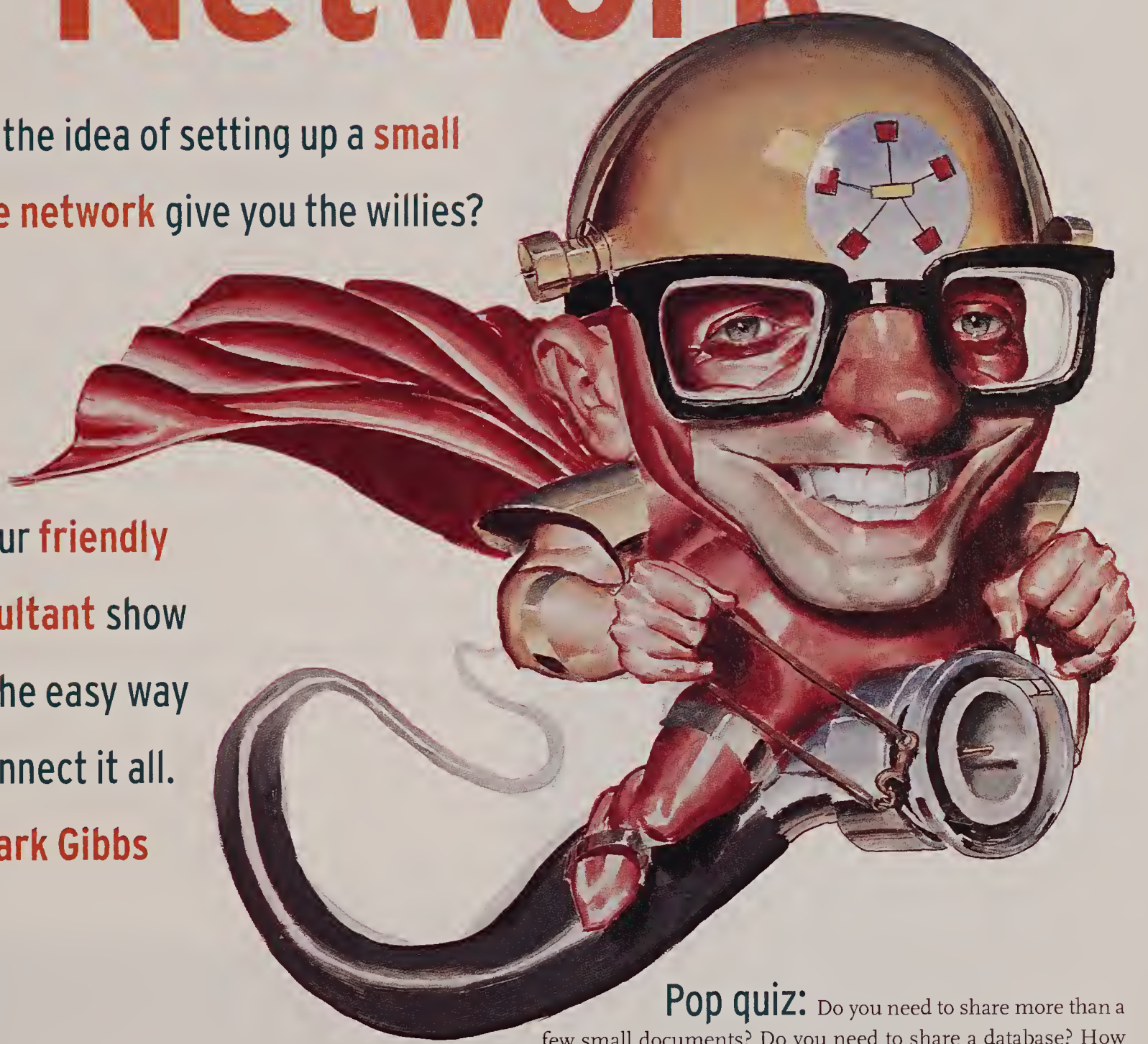
by Mark Gibbs



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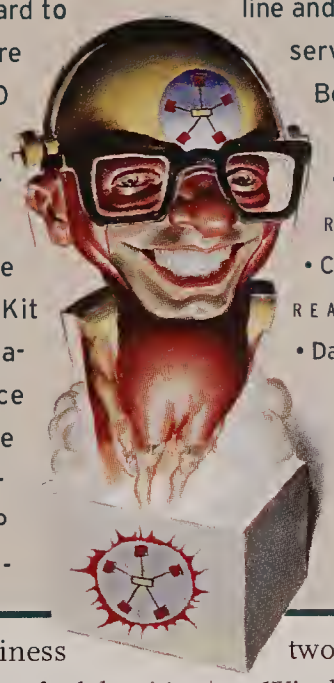
Instant Networks

A NUMBER OF VENDORS now offer so-called network-in-a-box solutions. These kits are great if you want to get up and running fast, since they contain all the hardware, software, and documentation you need for a complete small network. I recommend these kits if you intend to do it yourself. It's hard to go wrong with them, and they're cheap—around $200 to $300 for an eight-port hub, three cards, and unshielded, twisted-pair (UTP) cables.

For example, 3Com offers the OfficeConnect Networking Kit ($299), and Dayna Communications has the Small Office Starter Kit ($166). Both include three ethernet cards, an eight-port hub, and associated UTP cables. NetGear's SB104 Network Starter Kit ($179) includes one four-port ethernet hub, two cards, and two cables.

If you want to set up Internet access and your network at the same time, check out Compaq's latest offering: Microcom 808 Integrated Access Device ($899). It's designed not just to set up an eight-person LAN, but also to connect your office to the Internet using high-speed ISDN lines instead of phone lines. Of course, you'll still have to shell out for the ISDN line and for the account with your Internet service provider. Sound complicated? Better call your consultant.

—Mark Gibbs and Angela Freeman



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Almost every small business can benefit from being networked, but it's hard to know where to start. Read on—I'll share some basic tips and tricks that you can use to set up a network of your own.

WHAT KIND OF NETWORK SHOULD WE GET?

LET'S SEE...how many people in your office? Five? Well, you're in an interesting position: Your organization is just large enough to need a network but too small to warrant using a complex network operating system like Novell's NetWare or Microsoft's Windows NT. These products are almost mandatory for networks of 20 or more PCs, but they are complicated to install and maintain and, for your requirements, far too expensive.

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What kind of computers do you use? Ah, three PCs running Windows 95 and two Macintoshes? Good. If you had Windows 3.1 or Windows for Workgroups, I'd suggest upgrading to Windows 95—it makes networking a lot easier.

One of the great things about both Windows 95 and the Macintosh is that they come with built-in, easy-to-install, "peer-to-peer" networking, which is exactly what you need. That means that each networked computer can share its resources (hard drives, printers, applications) with all the other connected computers.

If you think your business might grow beyond a handful of people, it may be worth your while to install a client-server networking system. This is the province of the high-end network operating systems, such as Novell's NetWare and Microsoft's Windows NT. Client-server systems require one computer to act as the network server—typically, it's a separate machine with lots of RAM, fast disk drives, and so on. These server systems are powerful, but they require a lot of knowledge to implement and maintain.

WHAT EQUIPMENT DO WE NEED?

OKAY. WE HAVE our network operating system; now we need the hardware: network interface cards (NICs) and cables. Here the question becomes, Which networking technology do you want to use?

You might be tempted to buy an older NIC technology like ARCNET. Don't. These cards are cheap, but they're also slow and rapidly becoming obsolete. I prefer to stick with tried-and-true, up-to-date products because (1) they're known to be reliable, (2) it's easy to get support and/or replacement parts, and (3) they're usually the cheapest option.

The two primary network hardware technologies are token ring and ethernet. I can't recommend token ring for small network installations, though, because of its bulky hardware; thick, cumbersome cables; and higher price.

That leaves ethernet. Ethernet uses several cable types, but the two you need to think about are thin ethernet coaxial cable and unshielded, twisted-pair (UTP) cable—which looks a lot like telephone cable. Both are cheap and easy to install.

How you want to set up your net- ▶

When to Call an Expert

SURE, IT'S A LOT CHEAPER to set up a LAN yourself, and it can be relatively painless. However, bringing in expert help (such as me, your friendly network consultant) is a wise idea when:

You don't have time to learn the technology. A sloppy installation wastes time and could damage your business. (Imagine what would happen if your computers stopped working for a day.)

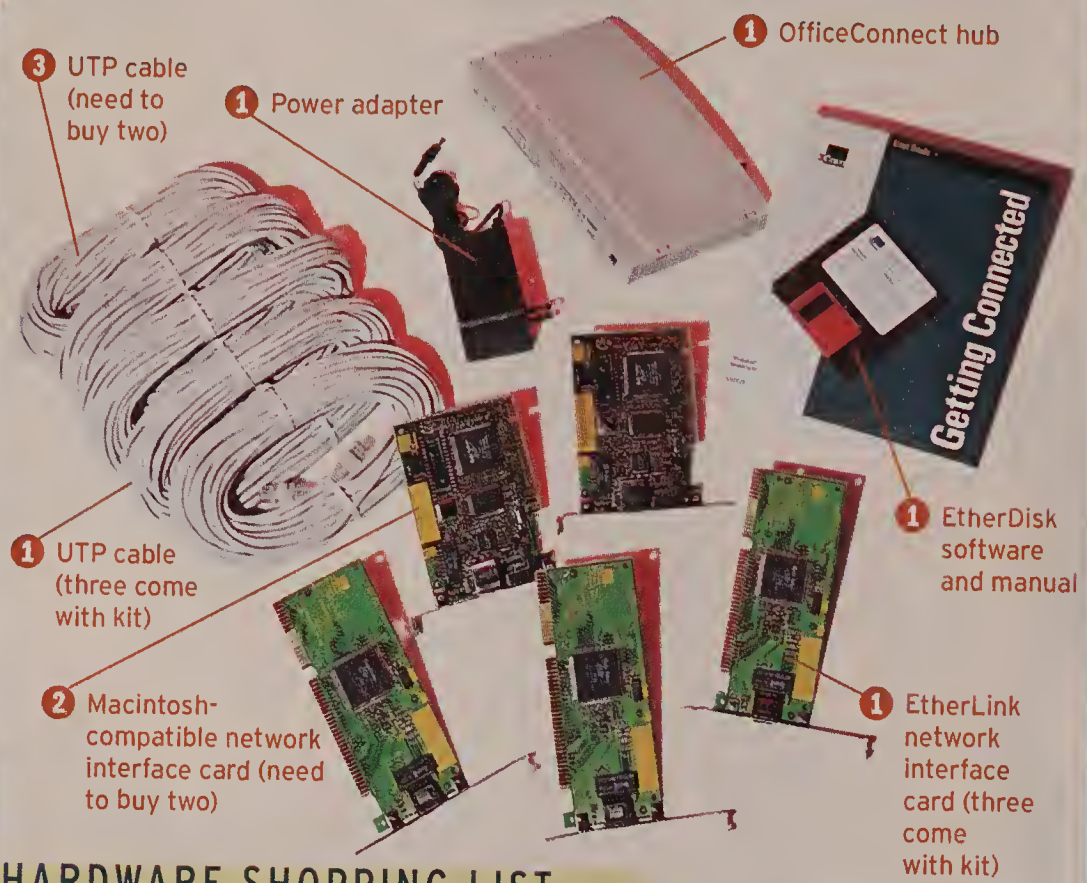
You have 25 employees or more. Your network is at a size that demands serious planning and careful implementation, not to mention a lot more hardware.

You want to share applications as well as storage and printers. Configuring software for network environments can get complicated, especially when it comes to setting access privileges.

Security is important. Creating a safe, secure network environment is tricky—there are more "gotchas" here than in a cheap insurance policy. —M. G.

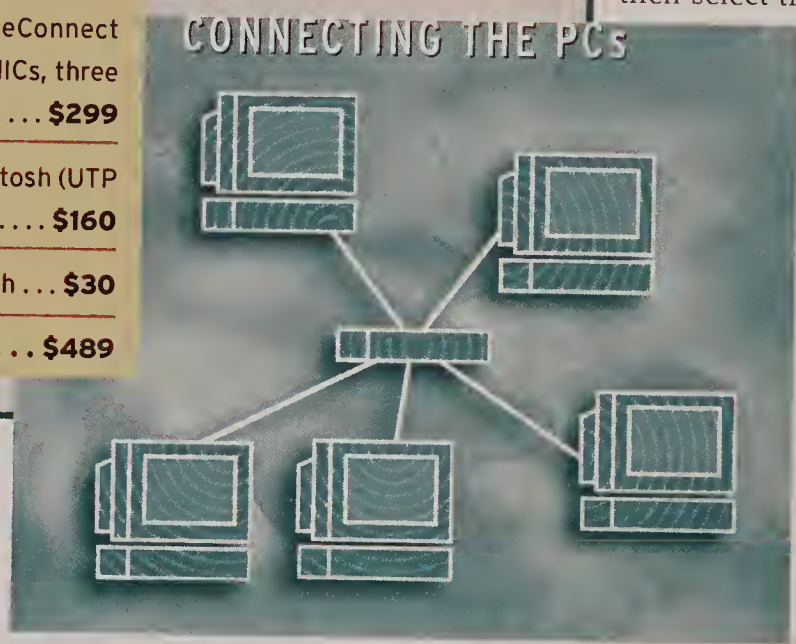
NET ESSENTIALS TWISTED PAIR

MOST ALL-IN-ONE products, like the OfficeConnect Networking Kit, include the hardware for a three-person UTP network; for five people, you'll need to purchase the rest separately. The network will look like a star, with interface cards wired to the central hub.



HARDWARE SHOPPING LIST

1	OfficeConnect Networking Kit (one OfficeConnect hub, one power adapter, three EtherLink NICs, three UTP cables): one kit at $299	$299
2	Ethernet network interface cards for Macintosh (UTP compatible): two at $80 each	$160
3	UTP cabling: two 50-foot cables at $15 each	$30
	TOTAL	$489



work will determine which of the cable types you'll choose. A LAN with thin ethernet cabling is essentially a chain of connections—computer A connects to computer B, which connects to computer C—while a UTP-wired network looks like a star, with one cable from each computer connected to a *hub*. A hub is a box that acts as a communications backbone, and it costs around $100. I recommend a UTP-based network—the flexible cable allows quick installation, and with the hub wired to each NIC, diagnosing problems is easier to accomplish.

There are a lot of cheap ethernet NICs on the market. My advice? Spend a little more on a name brand like 3Com or Eagle (usually the difference is only about $10). For your PCs, choose cards that are compatible with Windows 95's Plug and Play architecture. This standard lets Windows 95 detect the card model and set up the driver for you—one more thing that can make life simpler.

You can get NICs, cables, and hubs from just about any computer shop or catalog, either in the real world or on the Web. If you prefer one-stop shopping (and a single source for tech support), try one of the new network-in-a-box products. These kits contain all the equipment you need to get three or four PCs networked (see the sidebar, "Instant Networks").

HOW DO WE SET UP THE NETWORK?

WHETHER YOU USE a kit or buy the cards and cables yourself, here's what to do to get your network up and running. If you follow these and the manufacturer's instructions carefully, it will be very easy to do it yourself. If you don't, well, I'd be only too happy to do it all for you, for a wholly reasonable fee. (For a first-person account of setting up a home-office network, see *Real Solutions* on page 47.)

Start by switching off your computers. Then open each case and install the card in an available slot. Close each case, connect the cables, and restart the computers.

Windows 95 will detect the NIC and lead you through the process of installing the drivers, which should come with the NIC or be included with the operating system. On the Mac, you install the drivers, then select the NIC in the Network or AppleTalk control panel, depending on the version of your system software.

You'll have to tell your computer what protocols to use to communicate with the other computers. For Macs, the setup is minimal—give your machine a name using the Sharing Setup control panel, then select the protocol in the Network or AppleTalk control panel. With Windows 95, you'll have to use the Control Panel's Network dialog box to name the machine and to select which protocols to use—typically, you'll choose NETBEUI and the Microsoft Network Client.

To make your hard drives and printers sharable, click File and Print Sharing in the Network dialog box. Then select the Identification icon, and type a name for both your PC and your workgroup. If you're using a Mac, turn File Sharing on in the Sharing Setup control panel. ▶

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When you're done on either system, restart your computer and select your new network, from the Chooser on the Mac or from Windows Explorer on the PC.

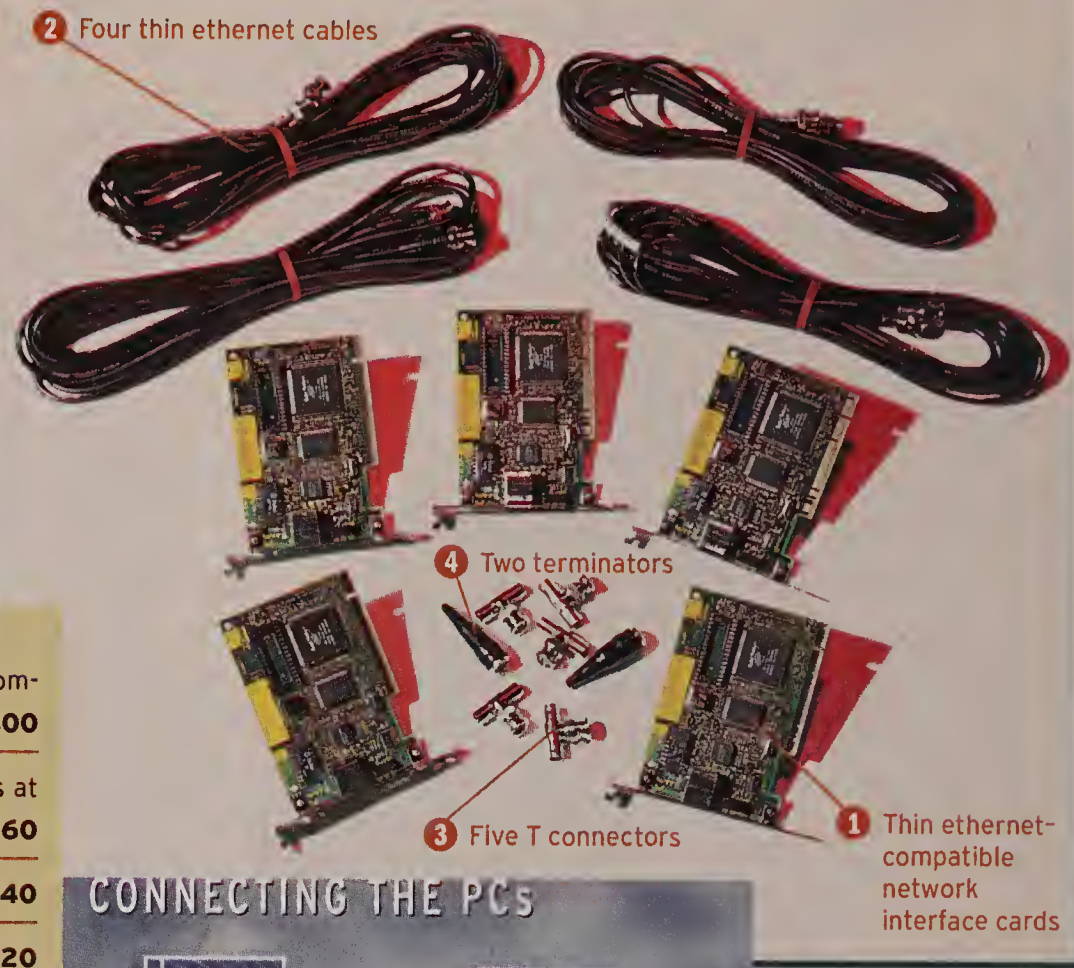
Getting the PCs to talk to the PCs and the Macs to talk to the Macs is easy; that's all built into each operating system. But to get the Macs talking to the PCs and vice versa, you'll need special software. The best-known products for this task are PC Maclan and CopsTalk, both of which let Macs and Windows 3.1/95 systems share each other's files and printers.

Now you have a basic network: Users can share files, use disk space on other machines, and access networked printers. Next, you may want to add a print, fax, or CD-ROM server. These devices are often of the plug-in, turn-on variety, with little or no configuration required. You just connect them to a networked computer, install a driver, and you're ready to go.

What's not so simple is sharing Internet access. For this, you'll have to add TCP/IP (Transmission Control Protocol/Internet Protocol) to all of your computers and configure your modem to connect to an Internet service provider.

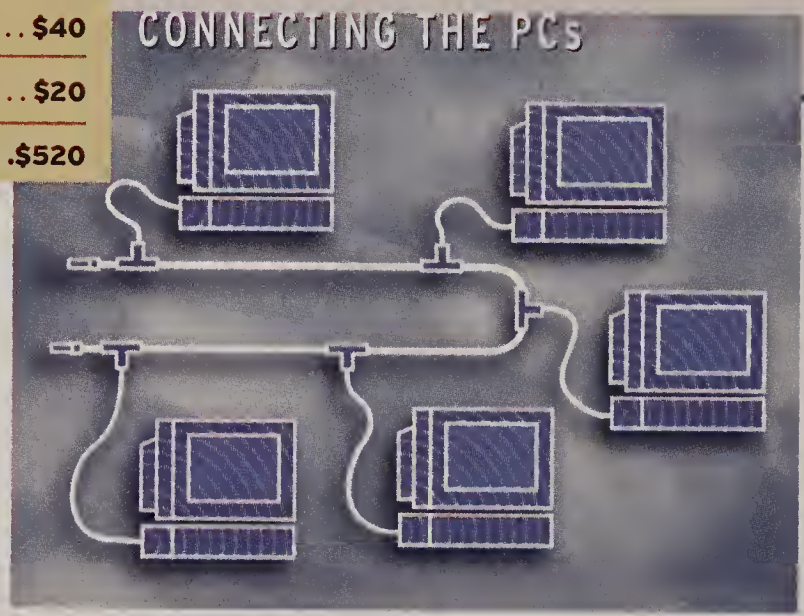
NET ESSENTIALS THIN ETHERNET

THE HARDWARE FOR a five-person thin ethernet network is pictured below. This type of cable is bulkier than twisted-pair cabling, and since the computers are linked together in a chain, diagnosing network problems can be difficult.



HARDWARE SHOPPING LIST

1 Network interface cards (thin ethernet compatible): five at $80 each	$400
2 Thin ethernet cabling: four 50-foot cables at $15 each	$60
3 T connectors: five at $8 each	$40
4 Terminators: two at $10 each	$20
TOTAL	$520



OKAY, WHAT NEXT?

WAIT, YOU'RE NOT OUT of the woods yet. Once your network is running, you need to consider security: Which resources are accessible by whom, and at what level? With a five-person network you're unlikely to be concerned with hackers, but you also don't want people snooping around in, say, the personnel files.

For starters, limit access to just those subdirectories that people need to do their jobs. You can set access privileges using Windows Explorer or the Macintosh Finder menu on the desktop.

Also, be careful which computer you connect to the shared printer. If the person using that computer spends all day accessing a database, then heavy printer use will slow them (and the printer) down. Everybody loses. Ideally, a shared printer should be attached to a fast computer—a Pentium 166 or better—and not one that belongs to a power user. If your staff does a lot of printing, dedicating a machine for that purpose might be a better idea.

What about doing backups on another computer? Unless the amount of data to be backed up is huge (more than 150MB), the only issue is whether the target machine has enough available disk space. You might consider dedicating a machine with a 2GB or larger hard drive to the task—and there's no reason why it shouldn't be the same one that hosts the shared printer. Another alternative is to buy a tape drive—an external 3.2GB Iomega Ditto Easy costs about $249. That way you can keep multiple sets of backups, and store at least one off-site.

You can share databases and other applications on the network, but read the vendor's documentation and license agreements carefully. It can be difficult to install the software correctly in a network environment. Databases work fine over a network but can be tricky to configure properly. For example, Microsoft Access must be opened in shared mode to support multiple users, and you'll need to

Working Without a Net

ALTERNATIVES TO INSTALLING A LAN

So the thought of installing a network terrifies you? Not to worry. You can still accomplish some of the same tasks without setting up a LAN, but you may spend more and get less.

SHARING DEVICES

If your office has only one printer, you need a tool that allows all your computers to share it. You can buy an A/B switch box (starting at around $10 to $15) that uses standard cabling to link two or more computers to a printer, but you can print only one job at a time. If you want more functionality, check out **PrintPoint**, a hub that connects to your PC's serial port and lets multiple users send data to the printer simultaneously. A five-user setup runs $375.

• Excellink, 800/923-5465, www.excellink.com

READER SERVICE NO. 759

Want to share just a modem? The $95 **TD-2** lets two computers use the same external modem. This gadget acts as a splitter, transmitting data from the modem to both PCs.

• Computer Peripherals Systems, 800/888-0051, www.cpscom.com

READER SERVICE NO. 760

SHARING DATA

You can always share data the old-fashioned way—save it on a floppy and walk the disk over to a colleague. But before long, you'll be up to your ears in floppies, with multiple versions of files floating around—a recipe for data disaster.

If the files are too large to fit on a floppy disk, a crude yet effective alternative is remote access software like **LapLink for Windows 95** ($150). You can link the machines and transfer files via a serial cable. It's a somewhat awkward fix, and transfers will be slow, but it's a relatively inexpensive way to share a few files without a LAN.

• Traveling Software, 800/343-8080, www.travsoft.com

READER SERVICE NO. 761

EXCHANGING E-MAIL

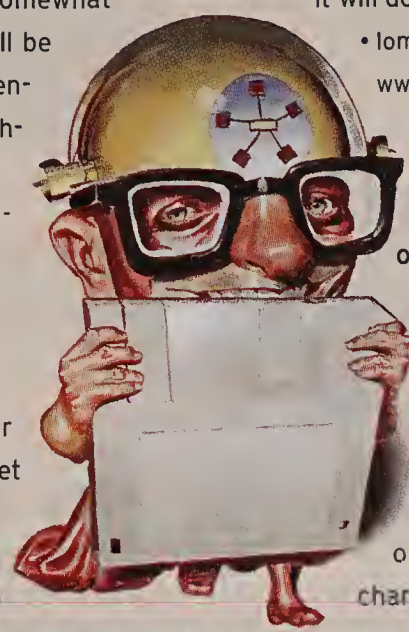
If you're already paying for Internet access, let your Internet service provider be your network. At $19.95 a month (in most cases), it's a cheap way to stay connected. If everyone has access to a modem, you can use e-mail to communicate with colleagues and access each other's data. Best of all, when the network goes down, you won't have to fix it yourself.

BACKING UP

You can back up the data on all your systems without a network, but it won't be pretty. You could buy an external tape drive, like Iomega's 3.2MB **Ditto Easy** ($249), and back up each computer individually. You install the software on each machine, then plug the drive into the parallel port to back up data. Elegant? No, but it will do the trick.

• Iomega, 800/697-8833, www.iomega.com

READER SERVICE NO. 762



Another option is to back up your data and store it online. Several companies offer Web-based backup, and prices range from $15 to $30 a month. Your data is compressed, encrypted, then uploaded and stored online. Careful, though—depending on how much data you store, charges can rack up quickly. —A. F.

run the User-Level Security Wizard to restrict user access.

Finally, don't forget that a network of any size needs to be supported and managed. You will have to make sure that shared disk space doesn't fill up with obsolete files, that printers are available, and that you understand how to fix things when they break.

But whether your network is simple or complex, whether you use it just to share a few files and a printer or for a shared database and Internet access, you'll be amazed at just how useful a LAN can be. Within a few weeks, you'll wonder how you ever lived without a network.

Now, speaking as your consultant, I have only one more question: Where should I send the bill?

OfficeConnect Networking Kit $299 street; 3Com; 800/638-3266; www.3com.com

READER SERVICE NO. 763

CopsTalk 2.1 $159; Cops; 770/840-0810; www.copstalk.com

READER SERVICE NO. 764

PC MacLan 6.1 $199 list; Miramar Systems; 800/862-2526; www.miramarsys.com

READER SERVICE NO. 765

Mark Gibbs is a contributing editor to Network World *and the coauthor of* Absolute Beginner's Guide to Networking, 2nd Edition *(Sams, 1994, 800/428-5331). Angela Freeman is a staff editor for* PC World. ■

Networking Resources

STILL HAVE QUESTIONS about networking? Can't reach your consultant? Take advantage of Usenet newsgroups. Chances are, you'll find more information than you bargained for, and it's free. If you prefer the printed word, check out these books. —M. G. and A. F.

USENET NEWSGROUPS

Comp.os.ms-windows.networking.misc: General information about networking PCs.

Comp.os.ms-windows.networking.win95: Look here for Windows 95 questions.

Comp.sys.mac.misc: Need your Macs and PCs to talk to each other? Look no further.

Comp.dcom.lans.ethernet: Lots of good tips and tricks to be found, though the conversation gets pretty technical.

BOOKS

Networking for Dummies, 2nd edition, by Doug Lowe; $19.99 (IDG Books, 1996, 800/762-2974).

Absolute Beginner's Guide to Networking, 2nd Edition, by Mark Gibbs and Todd Brown; $22 (Sams, 1994, 800/428-5331).

Windows 95 Networking Secrets, by Kevin Stoltz; $39.99 (IDG Books, 1996, 800/762-2974).

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Circle 215 on reader service card

Hot Picks for the Home Office

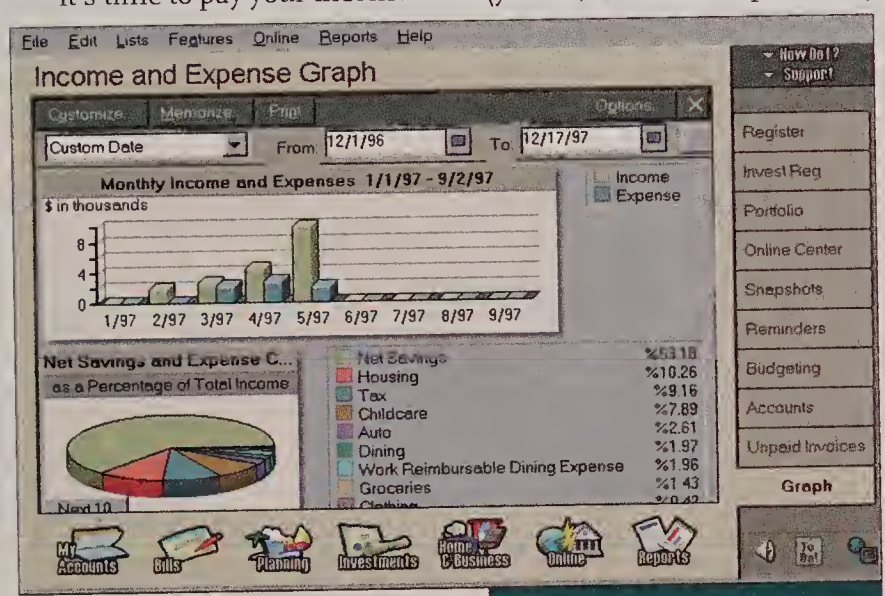
These are a few of our favorite things.

HP Color Copier 210

BY STEVE BASS

QUICKEN MEANS BUSINESS

IT SLICES, IT DICES, and now it does business. It's Intuit's Quicken Home & Business 98, a new version that helps small businesses make better sense of their affairs. With this new version, Quicken finally offers receivables: You can create invoices and examine the status of all your clients' transactions, so you can see who owes you money and when you'll receive payment. If you collect state sales tax, Quicken will calculate the amount and maintain the details in a separate account. There's also relief for your client-related business expenses. Just flag each one as a reimbursable out-of-pocket expense and apply it to the invoice. When it's time to pay your income taxes (you do, right?), Quicken will automatically gather data for the bane of every small business, the Schedule C form. You can generate an internal report, or transfer the data to Intuit's TurboTax program. Quicken does business—now you should, too. **Quicken Home & Business 98** $89.95 list, $20 rebate for upgrade; Intuit; 800/446-8848; www.intuit.com



Quicken Home & Business 98

COOL COLOR COPIES

WHEN I HEARD about it, I didn't believe it: a copier that does black-and-white *and* color documents for under $1000? Skepticism is part of my job, so I got my hands on Hewlett-Packard's HP Color Copier 210 and tried it myself. I placed a small color snapshot under the copier's tray, clicked the button, and in 30 seconds had an amazingly good color copy. It took only a minute to enlarge the photo to almost 8.5 by 11 inches, a 213 percent increase. And the 210 made traditional black-and-white copies in 13 seconds. The copier uses ink jet technology, which is found in many color printers, and HP claims the cost per copy is 2 cents for monochrome and 10 cents for color. The $700 HP Color Copier 110 churns out seven black-and-white and three color copies per minute. I have to admit: The HP Color Copier made a believer out of me. **HP Color Copier** 100 series $699 list, 200 series $999 list; Hewlett-Packard; 800/752-0900; www.hp.com:80/go/copiers

READER SERVICE NO. 766

NO MORE STIFF NECKS

ARE YOU STILL scrunching an old-fashioned telephone handset between your shoulder and neck? Put the phone down for a minute, I've got a terrific idea: Try a telephone headset. I switched to Plantronics' 1-ounce Supra Monaural and couldn't be happier. Not only is a headset more comfortable than a traditional handset, it makes it much easier to type and scribble notes while talking. There's more: Plantronics' Switcher Adapter lets me connect to my sound card. A quick click on the adapter's toggle switch and my sound card's output comes through my headset. I can listen to music, take a phone call over the Web, or play Quake without disturbing anyone else. **Supra Monaural Headset** $76 list, **Headset Switcher Adapter** $149.95 list; Plantronics; 800/544-4660; www.plantronics.com

READER SERVICE NO. 767

PRINTS CHARMING

HERE'S A RIDDLE: What's a quick way to stop wasting printer paper and save money on toner and ink jet cartridges? Nope, going back to paper and pencil is the wrong answer. The prize goes to LaserTools' Power PrintCache, a program that lets me crank out documents on both sides of the page or print reductions ▶

QUALCOMM

The combination to my office safe is: 18R 36L 24R

BEFORE YOU ASK WHAT KIND OF KNUCKLEHEAD WOULD BROADCAST HIS CONFIDENTIAL BUSINESS, MAY WE ASK IF YOU'VE GOT AN ANTI-EAVESDROPPING PHONE?

Trying to keep business calls private without our new Q phone is about as smart as making this guy head honcho of security. The secret is QUALCOMM's CDMA digital technology. It's the only technology that assigns each of your calls one of 4.4 trillion possible codes that continually scramble as you talk. The net result is private, secure calls. CDMA also protects you from phone number theft. Naturally, this phone is essential for those calls where confidentiality is important. You know, like gossiping about your boss and co-workers. For a closer look, contact us at www.qualcomm.com/cdma or 1-800-349-4188 or 1-619-651-4029 (outside USA).

The Q phone is now available from Sprint PCS℠

at these fine stores: Best Buy, Circuit City, RadioShack and Sprint PCS Centers

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Circle 197 on reader service card

CDMA Digital PCS Phone
Actual size closed 2¼" x 4"

Concero Switchboard

of rough drafts—up to 16 full pages' worth—on just one letter-size sheet. It really comes in handy when browsing the Web. When I find pages that interest me, I print a hard copy, using PrintCache to transform the pages into a neat little booklet, collated and perfectly formatted. But wait, there's more: The program also uses its own buffers to speed up printing, a feature Windows 3.*x* users will appreciate. The bottom line: Power PrintCache is a cool utility with clever ways to make my print chores painless. **Power PrintCache** $50 street; LaserTools; 510/420-1319; www.lasertoolscorp.com

READER SERVICE NO. 768

SMOOTH OPERATOR

COULD YOUR HOME OFFICE use someone to answer and manage calls while you're out? Mine, too. Instead of hiring someone, you might try Centrepoint Technologies' Concero Switchboard. When you plug your phone into it, the device acts like a PBX, using two standard incoming lines to give you six extensions, three-way conference calls, call transferring, Distinctive Ring detection, and even remote call forwarding. If you have more than one office at the same location, the Concero can connect six additional phones and transfer calls to other extensions. The Concero also automatically routes faxes to your fax machine or your computer's fax software. The Call Forwarding feature is neat: Callers are prompted to announce their name, which the Concero forwards to your current location. If you want to talk, you can then accept the call; if not, you can route it back to your answering machine. Connect the Concero to a PC or use it alone. Installing the system took less than 30 minutes, but fully understanding its myriad features took a few hours. **Concero Switchboard** $495 list; Centrepoint Technologies; 613/725-2980; www.ctrpoint.com

READER SERVICE NO. 769

BLACK AND WHITE AND READ ALL OVER

DO YOU EVER need to track your inventory? How about recording attendance at a meeting? Ever thought of using bar codes to do it? Don't laugh. I've used Zebra Technologies' Barcode Anything System to track members of my user group. First I designed bar-code labels using data imported from member accounts in Intuit's QuickBooks (you can also import data from Peachtree Complete and most popular databases and spreadsheets). I printed the bar codes on ordinary laser labels and stuck them to the backs of user group membership cards. Scanning each member's bar code made tracking attendance a snap (though I did feel a little like a supermarket checkout clerk). Plus, I now know immediately if a membership has lapsed. Barcode Anything comes with scanning and labeling software, a run-time Microsoft Access database, and a 32-bit scanning wand that attaches to a serial port. It works with Windows 3.*x*/95 and DOS. Next time you attend a user group meeting, don't forget your membership card. **Barcode Anything System 3.0** $299 ▶

You're cordially invited to try the "Hoity-Toity, Four Star, Invitation Only, Black Tie Affair" of address labels.

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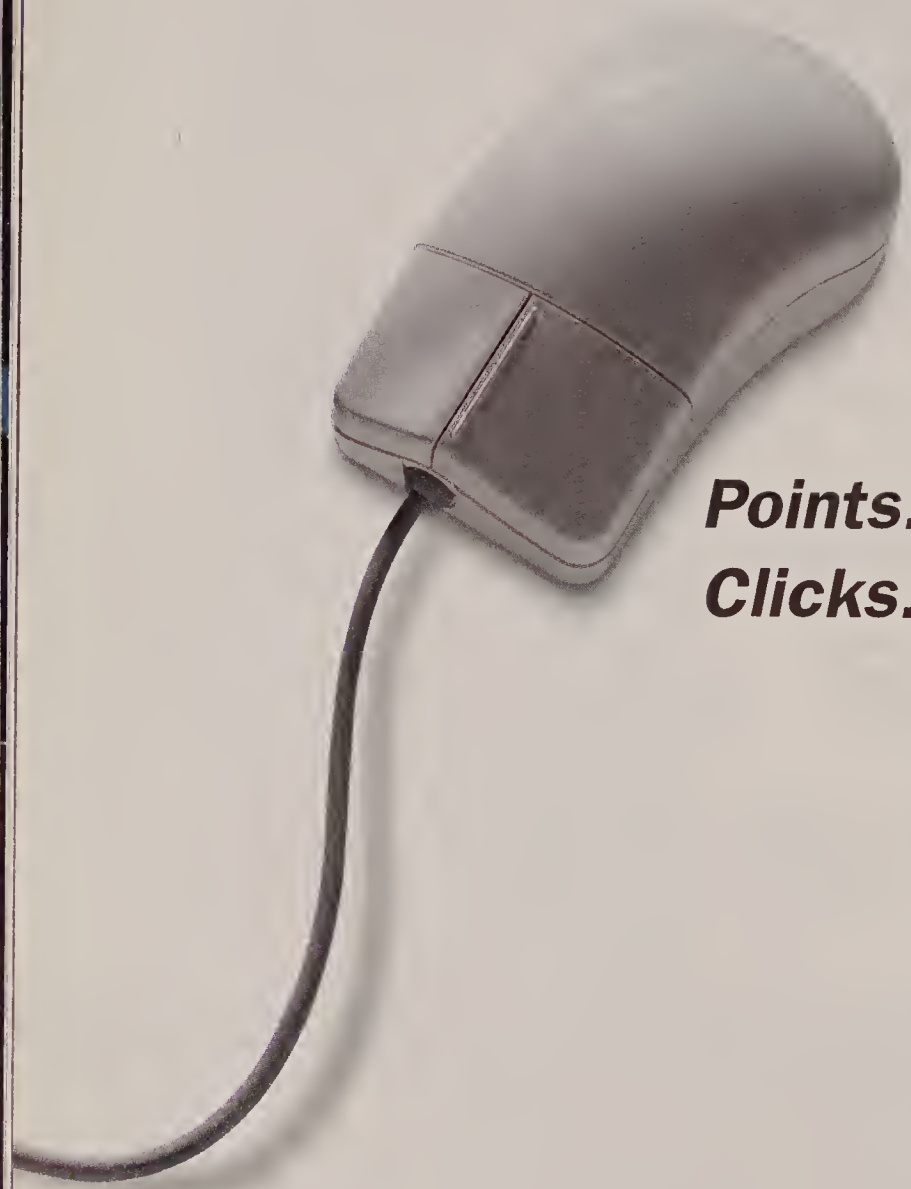

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*The Cross **iPen** makes pointing, clicking and navigating around your computer desktop much easier. It gives you greater control than you've ever had before.*

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For over 150 years, Cross Pen has stood for excellence in craftsmanship and quality. We thought it was time we added technology to that list.

*Get the point. Get the **iPen**.*

The iPen.
innovative. intuitive. incredible.

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Circle 67 on reader service card

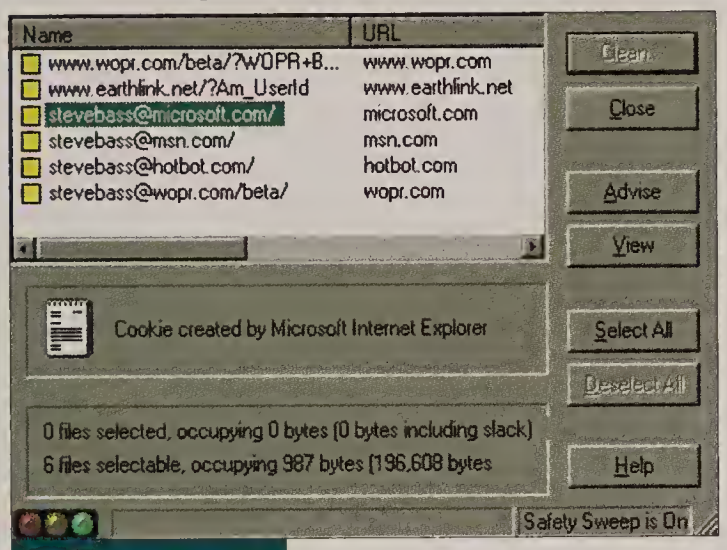
street; Zebra Technologies; 800/423-0422; www.barcodeanything.com

READER SERVICE NO. 770

DON'T GET ZAPPED

YOUR NEW COMPUTER set you back a bundle. So make sure you protect it with American Power Conversion's Surge-Arrest SurgeStation. For about $50, the SurgeStation, with a UL rating of 330 volts, protects your computer from AC and telephone-line power surges. It has eight outlets, three of which are spaced to handle bulky AC adapters. What's more, it includes a guarantee that pays up to $2500 if your computer is damaged by an AC spike or surge, including surges due to lightning. **SurgeArrest SurgeStation** $49.95 list; APC; 800/877-4080; www.apcc.com

READER SERVICE NO. 771



CleanSweep Deluxe

MAKE A CLEAN SWEEP

WANT AN EXCEDRIN HEADACHE? Try uninstalling a program from your Windows 95 system. I'll let you in on my remedy: Quarterdeck's CleanSweep Deluxe. Whenever I install a new program, CleanSweep jumps to attention, watches the installation, and logs the details. If I ever want to uninstall the application, CleanSweep can remove every trace. The program is safe: It backs up the uninstalled program for about 30 days, just in case I change my mind. The new deluxe version also monitors and lets me get rid of unused Internet browser plug-ins, ActiveX controls, old cache files, cookies, and shareware I've downloaded but don't need. CleanSweep's other tools ferret out duplicate and little-used files, redundant DLL files, and orphan programs. One quibble: The dialog boxes are too small and can't be made bigger. So instead of taking two aspirin, take one CleanSweep Deluxe—and *don't* call me in the morning. **CleanSweep Deluxe** $59.95 street; Quarterdeck; 800/683-6696, 813/523-9700; www.quarterdeck.com

READER SERVICE NO. 772

AccessLink two-way pager

REACH OUT AND PAGE SOMEONE

REMEMBER DICK TRACY'S two-way wrist radio? I have something cooler: AccessLink two-way pager from SkyTel. When I'm paged while out of the office, instead of racing to a phone, I can reply—right from my pager. The AccessLink pager looks pretty ordinary, but you can send, receive, and reply to messages using an integrated (though rudimentary) keyboard. But that's not all: My clients can send 80-character e-mail messages directly to my pager or call my toll-free pager number to verify that I've received the page—and to hear my reply. I even tried exchanging messages with my intrepid assistant (my AccessLink-equipped mom), and it worked perfectly: Dinner? Okay, Mom, see you Friday night. **AccessLink pager** $15 per month, plus $24.95 per month for 100, 80-character messages; SkyTel; 800/759-8355; www.skytel.com/products/st2way.html

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SmartMedia Card

DX-7 Digital Camera

DX-5 Digital Camera

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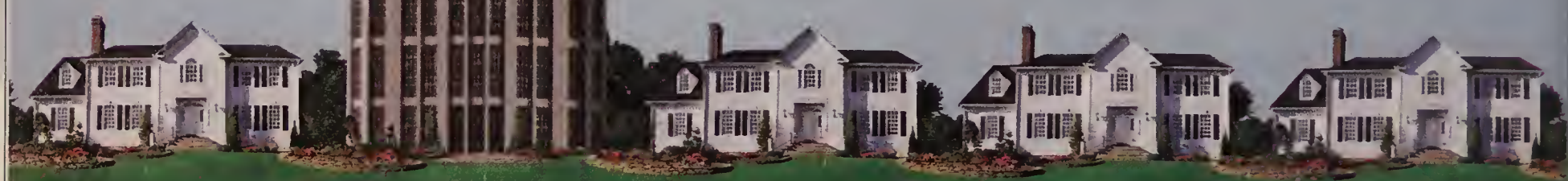

COMPUTER City OfficeMax SEARS RITZ CAMERA KITS

gram, and I wanted one that let me attach files to messages, manage a dozen mailing lists, and handle two Internet service providers. All roads pointed to Qualcomm's Eudora Productivity Toolkit. The program is terrific: With one call, it sends and picks up the e-mail on all my ISPs and directs them to separate Eudora mailboxes. I can have multiple personalities (not bad for a therapist, eh?), so that some recipients see a *PC World* return address, while others view my user group address. The Toolkit also includes MacAfee's VirusScan for checking e-mail; Pretty Good Privacy for encrypting messages; and KeyView, a plug-in for quickly viewing attachments. Eudora Productivity Toolkit works on Windows 3.*x*/95, and even on Macs. You can download Eudora Light, a scaled-down—and free—version and use it forever. But I'll bet once you try Eudora, you'll upgrade to the Productivity Toolkit in short order. **Eudora** Light free, Productivity Toolkit 3.03 $69 downloaded, $89 list boxed; Qualcomm; 800/544-4977; www.eudora.com

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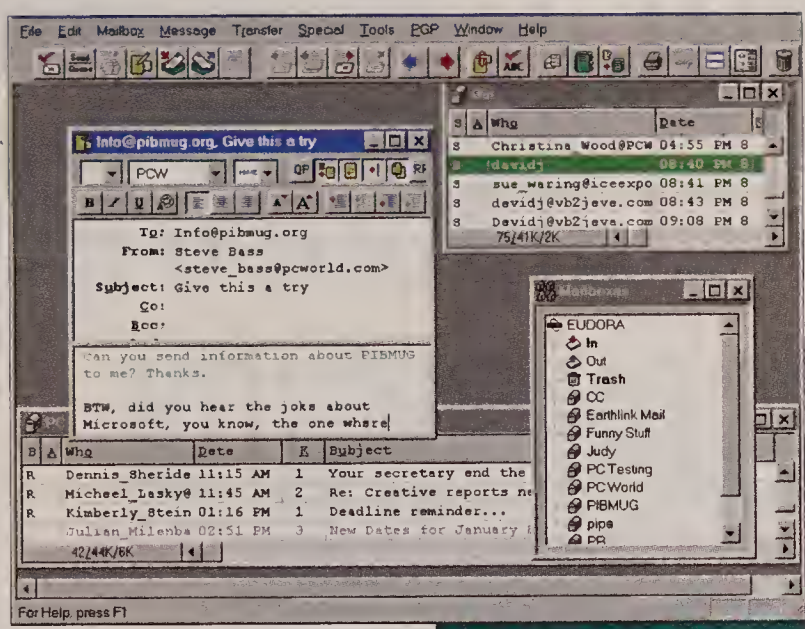

Eudora Productivity Toolkit

PLUG-INS UNPLUGGED

YOU'RE BROWSING the Web, having a great time. All of a sudden, Netscape Navigator says you don't have the right plug-in to view a video or play a sound file. Instead of searching the Web for the file and downloading it, grab a copy of Macmillan's Plug-In Power Pack. This handy CD-ROM is loaded with popular plugs-ins for Netscape, like RealPlayer 4.0, a great plug-in for listening to and viewing news on the Web. (And speaking of plugs, check out *PC World*'s News Radio at www.pcworld.com/news.) Other plug-ins let you view AVI, QuickTime, Video for Windows, and MPEG movies; read Acrobat documents; and listen to MIDI music. There are also hidden gems: Compass Light is an excellent tool for managing Netscape's bookmarks; Echo-Search performs intelligent probes of the Internet, using multiple search engines, and filters the data. The Power Pack contains more than 50 plug-ins, as well as a copy of the 1997 Internet Yellow Pages. Okay, then, get plugging. **Plug-In Power Pack** $18 street; Macmillan; 800/428-5331, 317/581-3500; www.macmillansoftware.com

READER SERVICE NO. 775

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READER SERVICE NO. 776

Steve Bass is a PC World *contributing editor and marriage and family therapist.*

For more information on all products in this article, circle reader service no. 910. ■

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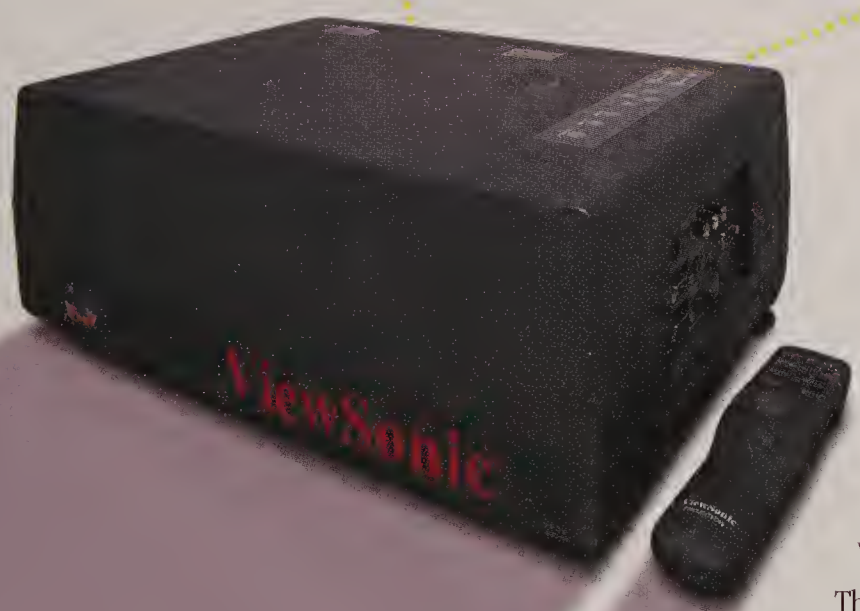

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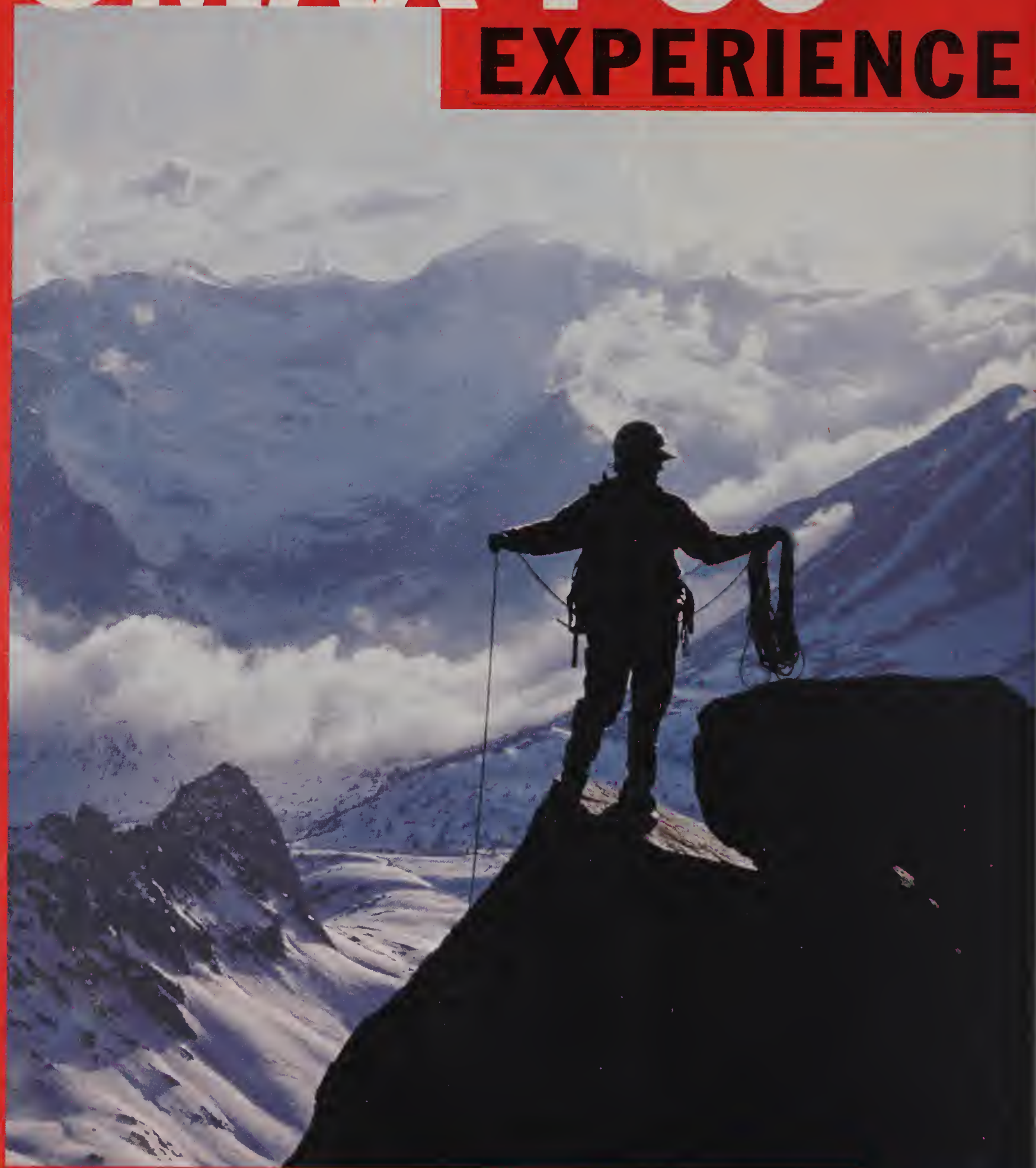

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- 10/100MB PCI Ethernet Card
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- Sound Blaster Compatible Sound
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- Yamaha Stereo Speakers with Sub-Woofer
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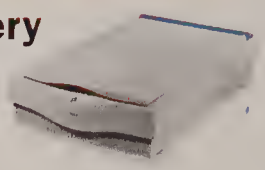

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- Iomega 100MB Zip Drive
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- 1.44MB Floppy Disk Drive
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- Matrox Millennium II 4MB VRAM Video Card
- 15" Flat Screen Color Monitor
- 56K Internal Data/Fax Modem
- 10/100MB PCI Ethernet Card
- Iomega 100MB Zip Drive
- Sound Blaster Compatible Sound
- 1.44MB Floppy Disk Drive
- Amplified Stereo Speakers
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Cadalyst Magazine explains it like this: "Hitachi's best move was to avoid compromises after deciding on the smaller tube size." Instead of beefing up 17" video electronics to handle a 19" tube, Hitachi took a 21" chassis with its best 21" digital control electronics and put a 19" tube in it. The result is performance every bit as good as the best 21 – far better than the performance of a souped up 17.

Other critics agree. Imaging Magazine judged the new Hitachi "BEST" of the recent AIIM show – over other 19" monitors at the show. And CRN's Test Center recommends the Hitachi.

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A monthly update of the best desktop PCs, notebooks, printers, monitors, graphics boards, and modems

PC WORLD

TOP 100

296 Power Desktops

312 Budget Desktops

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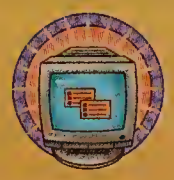
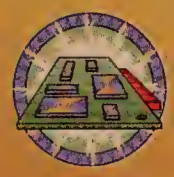
332 Home PCs

337 Printers

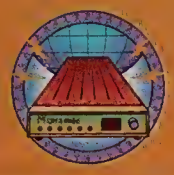
339 Monitors



343 Graphics Boards



345 Modems



DREAM Home PCs

EDITED BY GRACE AQUINO AND JOANNE ROBB

STYLE LEADER: The dapper two-tone HP Pavilion 8180 debuts on our Top 10 Home PCs.

HARDWARE BUYS IS A NEW PC on your holiday wish list this year? If so, chances are you're looking for a good all-around machine to use at home, for play as well as for work. You're not completely sure what you want, but you've probably decided on some must-haves: solid performance, a 17-inch monitor, speakers, a good modem, and a worry-free vendor support package. You don't want to wipe out your savings account, ▶

PHOTOGRAPHS: ROBERT CARDIN ICONS: JEFFREY PELO

but you're also willing to spring for some perks, like a multigigabyte hard drive, AGP graphics, or a built-in Zip drive.

According to *PC World* surveys, you're not alone. Nearly 55 percent of readers who responded to a recent poll said the home PC they planned to buy would serve personal *and* business needs. Forty percent said they would buy a home system purely for personal reasons. No novices, a third of these users already own two or more home PCs.

COLOR ME CABLES: With color-coding, PCs are easier to assemble.

Home systems are becoming such a hot ticket, we've decided they deserve more coverage. So we've expanded our Top 5 Home PCs review to a list of the Top 10—5 power and 5 budget. We've also moved the review from the @Home section to the Top 100 reviews. Our first Best Buys under the new format: Dell's Dimension XPS M233s and Gateway 2000's G5-166.

HOME, SWEET HOME PC

WHAT MAKES a good home system? For our Top 10 Home PCs, we look for the same things we look for in our business systems: good performance, a reasonable price, and top-notch reliability and service. But what sets a home PC apart is easy setup, home software, and extra-cool gadgets.

Many PCs marketed as home machines, including both Home Best Buys, come with color-coded cables or simple setup instructions to help less-experienced users through the first steps. Monorail's 7366e-PR166 system, in fifth place on our Home PCs budget chart, is one example: Other than keyboard and mouse hookup, it requires no setup.

Well-rounded home PCs also include software that will appeal to the whole family. For example, the two new Pavilions that appear in this month's Home PCs power section, the 8180 and the 8140, come equipped with everything from Quicken SE for the family financier to Reader Rabbit 2 for the very youngest PC enthusiast. Want to treat yourself to a fun extra? The Home PCs budget Best Buy—Gateway's $1499 G5-166—comes with a Canon BJC 250 color bubble jet printer.

But not all PCs marketed as home machines come with traditional home PC features. Companies like Dell are muddying the waters by touting some machines as home *office* systems. For example, this month's power Best Buy—Dell's Dimension XPS M233s—has no kiddie software and no games, just color-coded cables and conservative applications like Microsoft Office Small Business Edition.

CLEANING HOUSE

TO MAKE ROOM for our extra home PC coverage, we had to cut back elsewhere. According to our surveys, *PC World* readers buy fewer notebooks than any other type of system. Therefore, we've trimmed our Top 20 Notebook PCs chart to a Top 10 list—5 power and 5 budget portables.

Only one new portable made the chart: Gateway 2000's Solo 2300XL, our new power Best Buy. The Solo 2300XL claims the title of fastest portable we've ever tested; it's a touch speedier than last month's second-place power Best Buy, another PMMX-233 from Gateway—the Solo 9100XL. The new Solo is not as luxurious as the 9100XL; it has only a 12.1-inch screen and a 10X CD-ROM drive, compared to the 9100XL's 13.3-inch screen and 12X–20X CD-ROM drive, but at $4049, it's $850 cheaper.

PII-266 TAKES THE CHART

OF THE SIX NEW systems on the Power Desktops chart this month, only one earns a Best Buy. The Quantex QP6/300SM-3x is almost as speedy as the fastest desktop we've tested, the Gateway 2000 G6-300XL. And with a low $2999 price, it ranks ahead of the Gateway. Like the Gateway, the Quantex QP6/300SM-3x is based on a Pentium II-300 chip and supports the Accelerated Graphics Port.

SPEED DEMON: Power Best Buy Quantex is one of the fastest PCs we've tested.

The remaining new systems on the Power chart are PII-266 PCs. The Gateway 2000 E-3100 PII-266 is fast and relatively inexpensive, but without a modem or sound card, it can claim only eighth place. None of the four other new power systems are stellar performers for their CPU class, but their assets gain them places on the chart. For example, the $2899 Acma and the $3099 Amax both come with a Zip drive and a 56-kilobits-per-second modem.

Only two new systems appear on the Budget Desktops chart. The $1949 Quantex QP5/233 M-3 is a number three Best Buy, and the $1349 Micro Express MicroFlex-F210A, an AMD K6-200 machine, claims sixth place.

SETTING HIGHER STANDARDS

PC PRICES keep dropping, so this month we lowered the price cutoff between Power and Budget systems from $2500 to $2250. Now systems that cost over $2250 compete for Power-chart status, while those costing $2250 or less go in the Budget category. As a result, more lower-price PCs, such as Netis's $2390 Starburst 266, are eligible to compete for positions on our Power chart.

Every few months we also adjust our overall scoring system to keep up with PC advances. This month we cranked up the criteria for price, performance, and features to reflect the faster, cheaper, better-equipped systems we're seeing. For example, Budget Best Buy Dell Dimension M200a, a very good performer in its heyday, is now rated only good compared to today's faster PCs.

LARGER THAN LIFE: HP DeskJet 1000Cse prints oversize images.

PRINTER PICTURES

IF YOU BELIEVE all the ads, just about any of today's inexpensive color ink jets can give you photo-quality printing. But can a sub-$300 printer really take the place of the corner Fotomat? This month's roundup of personal printers reveals that some color ink jets—like the Canon BJC-4300—come close to 35mm-quality, but only with special papers and inks, which can be costly.

One of the most interesting color printers that didn't make our Top 10 Printers chart is HP's DeskJet 1000Cse. Able to print on paper up to 13 by 19 inches, the $499 1000Cse could be good for oversize printouts.

Grace Aquino is an assistant editor and JoAnne Robb an associate editor for PC World. *Editorial Researcher Julie Campagna, Editorial Assistant Mick Lockey, Associate Editor Karen Silver, Senior Associate Editors Rex Farrance and Bryan Hastings, and freelance writers Allyson Bates, Eric Hellweg, Dan Littman, and Susan Silvius contributed to the Top 100. Testing for the Top 100 completed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeffrey Kuta, and Mike Salayko. See page 14 for contact information.* ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them. If not, ask us; see page 14 for contact information.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, monitors, modems, printers, and graphics boards we've tested. The Top 20 charts are divided by price. Power desktops cost $2250 or more; power notebooks cost $2750 or more. Every month we test the latest products in each category and compare them to the pool of items we've already reviewed. As new products earn places on the charts, those at the bottom drop off. Price cuts also cause chart changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

What does the overall rating mean? It's the sum of all our tests—both hands-on evaluations and automated speed tests. The scale is 1 to 100, so a product that scores in the 90s is generally considered exceptional, one in the 80s is among the best, one in the 70s is above average, and one that scores lower usually doesn't place.

What does the PC WorldBench score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Dell P75t configured with 8MB of RAM, a 540MB hard drive, and no secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline unit.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores come from readers responding to Reliability and Service surveys. The policies score is based on vendor support policies (such as length of warranty for parts and labor, weekday toll-free support hours, and weekend and online support availability).

What do all those word scores mean? Word scores for performance and price are based on a product's rating in relation to other products in its category. For example, a budget PC that is rated "expensive" is high priced only in relation to other budget PCs. Likewise, a power notebook rated "good" for performance is good only in relation to other power notebooks. Word scores for other categories, such as features, are relative to all desktops or all notebooks.

Where can I find the online version of the Top 100? Go to PC World Online (www.pcworld.com). There you'll find not only the current issue of *PC World* and reviews from back issues, but some extra features, including reviews not available in print. You can read full reviews of Top 10 products, for instance, by going directly to the URL provided in each Top 100 section.

Have you ever wished you could build your own chart based on your buying criteria? You can, with Buyer's Guide, our Web site's unique chart customizer. Buyer's Guide combines your criteria with *PC World*'s current data and test results to generate customized Top 20s and Top 10s. For instance, if you want your chart to rank notebooks that have 120-MHz processors and 1.6GB hard drives, the guide's Personal Adviser will find and rank all the machines that fit your specifications.

PC WORLD

TOP 20 POWER DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (9/15/97)	CPU	Comments
1	Dell Dimension XPS D266 800/388-8542 www.dell.com	1	Nov 97	$3079	Pentium II-266	$20 price drop on fast system with AGP graphics; 233 also good.
2	Dell OptiPlex Gxa266 800/388-8542 www.dell.com	3	Nov 97	$2888	Pentium II-266	Quick, integrated ethernet and AGP, terrific reliability and support ratings.
3	Gateway 2000 G6-233 800/338-0169 www.gateway.com	4	Aug 97	$2735	Pentium II-233	$104 price drop on fast, loaded PC with Ultra DMA hard drive.
4	Quantex QP6/300SM-3x 800/896-4898 www.quantex.com	–	NEW	$2999	Pentium II-300	Most affordable PII-300 we've tested, AGP graphics, excellent support policies.
5	Gateway 2000 G6-300XL 800/338-0169 www.gateway.com	5	Nov 97	$3799	Pentium II-300	Fastest-ever performance, AGP graphics, great 19-inch monitor, terrific sound.
6	Quantex QP6/266 WS-3x 800/896-4898 www.quantex.com	–	Oct 97	$2499	Pentium II-266	Average performance for a PII-266, ethernet card, speakers; no modem.
7	Micron Millennia XKU 300 800/634-8799 www.micronpc.com	12	Nov 97	$4087	Pentium II-300	$100 off top-flight performer, great 19-inch monitor, super sound system, AGP.
8	Gateway 2000 E-3100 PII-266 800/338-0169 www.gateway.com	–	NEW	$2889	Pentium II-266	Fast system comes with AGP support but is missing sound card and modem.
9	Sys Technology Performance 233K6 800/613-9963 www.systechnology.com	10	Nov 97	$2721	AMD K6-233	Well-designed machine with business apps; support policies could be better.
10	DTK Quin-57M/PM233 800/289-2385 www.dtkcomputer.com	–	Oct 97	$2453	Pentium MMX-233	Good performance, 56-kbps modem; support policies need improvement.
11	NMC Expert Pro II 800/800-4662 www.natmicro.com	13	Sept 97	$2595	Pentium II-266	Well-priced system with good graphics card; not many extras.
12	Sys Technology Performance Pro 266A 800/613-9963 www.systechnology.com	14	Oct 97	$3121	Pentium II-266	$128 off fast PC with big hard drive, great multimedia; policies could improve.
13	Acma EXP Pro PII 266 800/786-6888 www.acma.com	–	NEW	$2899	Pentium II-266	Comes with Zip drive, 56-kbps modem; no extra software, limited support.
14	Netis Starburst 266 800/577-7526 www.netistech.com	–	NEW	$2390	Pentium II-266	Very inexpensive; no bells and whistles, but it covers all the basics.
15	Premio FX2 Shadowhawk 266 800/677-6477 www.premiopc.com	17	Oct 97	$2750	Pentium II-266	Fast, 64MB of RAM, good sound; lacks a modem.
16	Digital Celebris GL-2 6200 800/722-9332 www.digital.com	–	Mar 97	$3224	Pentium Pro-200	$213 price drop, good support and system reliability ratings.
17	Amax GFX Pro 266 800/800-6328	–	NEW	$3099	Pentium II-266	Comes with Zip drive, 56-kbps modem; support policies could be better.
18	Everex StepStation2 800/383-7391 www.everex.com	–	NEW	$3075	Pentium II-266	Fast machine, best support policies; could be cheaper for what you get.
19	Digitron PS4000 888/708-2800 www.digitronpc.com	18	Oct 97	$3845	Pentium II-266	$150 price drop on speedy minitower, great multimedia and expandability.
20	Nova PII-266 800/461-5535 www.novacominc.com	16	Nov 97	$2975	Pentium II-266	Fast, well built, expandable, good Roland speakers; $301 price increase.

Best Buy See features chart, page 298; test report, page 304.

[1] Insufficient data to give a rating.

WHICH OF THESE SYSTEMS IS NOT LIKE THE OTHERS? Of the six new systems on this month's Power Desktops chart, only one—the Quantex QP6/300SM-3x—is a Pentium II-300. All the rest are based on Pentium II-266 processors. In fact, the PII-266 chip still dominates the Power chart. Two PII-266s from Dell top our list—the Dimension XPS D266 and the OptiPlex Gxa266. However, not every Pentium II-266 we tested claimed a spot. The DTK Apri-74M/K233, for example, didn't have the overall quality needed to take a position on our Top 20. To read about the DTK and other runners-up, visit PC World Online (www.pcworld.com/t20pcs).

SCORECARD

★ Overall rating	PC WorldBench score/performance	Vendor's system reliability	Features and design	Price	Vendor's support quality/policies	Reader service number
88	264/outstanding	best	very good	average	best/best	639
88	259/very good	best	very good	average	best/best	640
85	251/good	fair	outstanding	average	best/best	641
83	269/outstanding	good	good	average	good/best	642
83	272/outstanding	fair	outstanding	very expensive	best/best	643
81	255/very good	good	good	inexpensive	good/best	644
80	270/outstanding	good	very good	very expensive	best/best	645
78	262/very good	fair	satisfactory	average	best/best	646
78	251/good	[1]	outstanding	average	[1]/poor	647
76	241/good	[1]	outstanding	inexpensive	[1]/poor	648
76	260/very good	[1]	very good	inexpensive	[1]/fair	649
76	264/outstanding	[1]	very good	average	[1]/poor	650
76	258/very good	[1]	very good	average	[1]/fair	651
74	257/very good	[1]	good	very inexpensive	[1]/fair	652
74	257/very good	[1]	good	average	[1]/poor	653
74	229/satisfactory	good	outstanding	expensive	[1]/good	654
73	258/very good	[1]	good	average	[1]/poor	655
73	257/very good	[1]	good	average	[1]/best	656
73	259/very good	[1]	outstanding	very expensive	[1]/poor	657
73	260/very good	[1]	good	inexpensive	[1]/fair	658
Scorecard weightings ▶	Performance 25 percent	Reliability 25 percent	Features 20 percent	Price 15 percent	Support 15 percent	All products: 905

This Month's Best Buys

1 DELL DIMENSION XPS D266

PRO: Fast, fine design, huge hard drive, best reliability and support ratings

CON: Awkward monitor controls

This well-equipped, cutting-edge Pentium II-266 combines superb performance with the outstanding reliability and support that consistently keep Dell PCs near the top of our charts.

The $3079 Dimension XPS D266 uses Intel's new, more advanced 440LX chip set and provides Accelerated Graphics Port support. AGP promises to speed video processing using a dedicated graphics bus that can move data twice as fast as PCI. This sounds great, but we haven't seen much benefit so far. The AGP systems we've tested, which include the Gateway and Micron Pentium II-300 systems on this month's Power chart, are indeed superb performers, but in our tests they do not run business apps substantially faster than the similarly configured systems that use PCI graphics.

You can buy the XPS D models in 233- and 300-MHz versions, too. The Pentium II-300 machine produced a PC WorldBench score of 270—outstanding, but only about 2 percent faster than the Pentium II-266. At $200 less, the D266 is a better value—unless you need bragging rights to the fastest CPU.

For the most part, the D266 is top-drawer: You get 64MB of SDRAM—enough for the system to handle several programs running multimegabyte files. The fast Ultra DMA IBM hard drive has room for 8.4GB of programs and data, and it's paired with a bus-master IDE controller for superefficient disk access. The NEC CD-ROM drive reads at speeds from 12X to 24X, and the internal 3Com/U.S. Robotics Sportster modem downloads at close to 56 kilobits per second. Even the Sound Blaster AWE64 board is top of the line. In spite of all these peripherals, the minitower offers four empty drive bays and four free expansion slots. To top it all off, the system comes with Microsoft Office 97 Small Business Edition.

We were less impressed with Dell's economy-class 1000LS 17-inch monitor, built around a Philips tube—although it's a big improvement over the previous LS model. The image quality is good for a basic model, but the controls could be better. Push one of the four buttons, and a menu appears on screen; if you hesitate a moment while trying to figure out how to adjust the image, the menu vanishes, and you have to start over.

Dell Dimension XPS D266

The Altec Lansing ACS 290 subwoofer-equipped speakers sounded bass-heavy to our ears, no matter how we tweaked them. True sound aficionados should spend $49 more and get Dell's top speaker offering, the ACS 490. ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 POWER DESKTOPS — STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension XPS D266*	Pentium II-266	64	512	8.4	STB Velocity 128 3D	4/SGRAM	17/15.9	.28	12X-24X
2	Dell OptiPlex Gxa266*	Pentium II-266	32	512	3.2	integrated ATI 3D Rage Pro AGP	4/SGRAM	17/15.8	.26	12X-24X
3	Gateway 2000 G6-233*	Pentium II-233	64	512	3.2	ST8 Velocity 3D AGP	4/SGRAM	17/15.9	.28	12X-16X
4	Quantex QP6/300SM-3x*	Pentium II-3DD	64	512	6.4	Diamond Viper V330	4/EDD DRAM	17/16	.28	12X-24X
5	Gateway 2000 G6-300XL*	Pentium II-3DD	64	512	8.4	ST8 Velocity 128	4/SGRAM	19/18	.28	12X-24X
6	Quantex QP6/266 WS-3x	Pentium II-266	32	512	4.3	Matrox Millennium	4/WRAM	17/16.1	.28	12X-16X
7	Micron Millennia XKU 300	Pentium II-300	64	512	6.4	Diamond Viper V330	4/SGRAM	19/18	.22	12X-24X
8	Gateway 2000 E-3100 PII-266	Pentium II-266	64	512	4	ATI 3D Rage II+	4/SGRAM	17/15.9	.26	12X
9	Sys Technology Performance 233K6	AMD K6-233	32	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.9	.26	12X-24X
10	DTK Quin-57M/PM233	Pentium MMX-233	64	512	2.1	Diamond Stealth 3D 30DD	4/VRAM	17/15.8	.28	12X-16X
11	NMC Expert Pro II	Pentium II-266	64	512	5.1	Matrox Millennium II	4/WRAM	17/15.9	.28	12X-16X
12	Sys Technology Performance Pro 266A	Pentium II-266	32	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.8	.26	12X-16X
13	Acma EXP Pro PII 266	Pentium II-266	32	512	3.2	STB Nitro 3D	4/DRAM	17/16.1	.26	12X-16X
14	Netis Starburst 266	Pentium II-266	32	512	3.1	Matrox Millennium	4/WRAM	17/16.1	.25	12X
15	Premio FX2 Shadowhawk 266	Pentium II-266	64	512	3.2	ATI 3D Pro Turbo PC2TV	4/SGRAM	17/15.9	.28	8X
16	Digital Celebris GL-2 6200	Pentium Pro-20D	32	256	3.2	integrated MGA-2D64W	4/WRAM	17/16.1	.28	12X-16X
17	Amax GFX Pro 266	Pentium II-266	32	512	3.2	Matrox Millennium II	4/WRAM	17/15.9	.25	12X-24X
18	Everex StepStation2	Pentium II-266	32	512	3.1	Matrox Millennium II	4/WRAM	17/16.1	.28	12X-24X
19	Digitron PS4000	Pentium II-266	32	512	4.3	STB Velocity 3D Video	4/VRAM	17/16.1	.25	12X-16X
20	Nova PII-266	Pentium II-266	64	512	5.1	Matrox Millennium II	4/WRAM	17/16.1	.26	12X-24X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

2 DELL OPTIPLEX GXA266

PRO: Great design, fine Trinitron monitor, built-in ethernet, best reliability and support ratings

CON: No modem, skimpy software bundle

With changes to our charts this month, the Dell Dimension XPS M233s—our second-place Best Buy last month—now competes only on the Top 10 Home PCs charts. Therefore, the OptiPlex Gxa266 moves up a notch and takes second place.

Dell's OptiPlex systems are aimed at networked corporate environments—especially offices where sensible design and reasonable price matter more than the very latest in technology. The new OptiPlex GXa266 holds to that course, varying only to include an integrated 2MB AGP graphics controller. The good news is, the GXa266 doesn't make you give up much performance for its button-down stability: With a PC WorldBench score of 259, it's within 2 percent of the speed of a comparably equipped Dimension XPS D266. In addition, Dell says it puts all new OptiPlex models through an exhaustive round of network compatibility tests before it releases them for sale.

Dell OptiPlex GXa266

What do you get for the $2888 you'll spend on the OptiPlex GXa266? Good performance, from a Pentium II-266 CPU; a roomy minitower case; a crisp 17-inch Dell Trinitron monitor; and a comfortable keyboard. Our system also came with a 3.2GB hard drive, an NEC 12X–24X CD-ROM drive, an integrated ethernet adapter, and 16-bit sound. The GXa266 adds an Altec Lansing ACS 290 speaker set with a subwoofer that yields somewhat muddy bass notes, but the system isn't priced with a modem.

The coolest thing about the GXa266 is its clever design. Seven slots are free, and getting to them couldn't be simpler. Once you remove the case, just lift a lever, and the entire circuit board holding the expansion slots slides right out of the machine. Reinstalling it after you add or remove cards is equally easy. And the entire power supply swivels up and out of the way to give you easy access to memory and the CPU.

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max. RAM (MB)	Maximum secondary cache (K)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56 [1]	Sound Blaster AWE64	minitower	384	512	2	3/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
–	integrated Crystal PnP Audio	minitower	384	512	2	2/1	7	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Ensoniq Audio PCI Wavetable	minitower	256	512	2	3/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [2]	integrated	minitower	192	512	1	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	Ensoniq ESI370 Audio PCI	tower	384	512	1	3/5	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
–	OEM	minitower	256	512	2	3/3	5	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	Sound Blaster AWE64	minitower	384	512	1	2/0	3	3/1	24	Sat., Sun.	BBS, CIS, WWW
–	–	minitower	256	512	1	3/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Sound Blaster AWE32 PnP	minitower	512	512	5	3/2	3	varies [3]/1	24	Sat., Sun.	–
56 [1]	Sound Blaster CT 4380 AWE64	minitower	256	512	4	3/2	4	2/2	9	–	BBS, WWW
33.6	Sound Blaster CT 3600	minitower	384	512	4	1/1	4	3/3	9	–	WWW
33.6	Sound Blaster 32 IDE PnP	minitower	768	512	4	3/2	4	varies [3]/1	24	Sat., Sun.	–
56 [1]	Sound Blaster AWE64	minitower	128	512	2	0/1	2	3/1	10	–	BBS, WWW
33.6	integrated	minitower	256	512	2	1/1	4	1/3	10	Sat.	BBS, WWW
–	Sound Blaster AWE32 PnP	minitower	1024	512	3	2/0	5	3/3	9	–	BBS, WWW
56 [1]	integrated	minitower	192	256	4	2/1	4	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	Sound Blaster AWE32	minitower	512	512	6	2/0	3	3/1	9.5	–	BBS, WWW
56 [1]	Sound Blaster 32 IDE PnP	minitower	768	512	4	3/1	4	3/3	24	Sat., Sun.	AOL, BBS, WWW
33.6	Sound Blaster AWE64 CT4380	minitower	1024	512	6	3/1	4	1/1	9	Sat.	WWW
56 [1]	integrated	minitower	128	512	2	3/0	4	3/3	8	–	WWW

[3] Six years on CPU and main RAM, one to five years on other parts.

3 GATEWAY 2000 G6-233

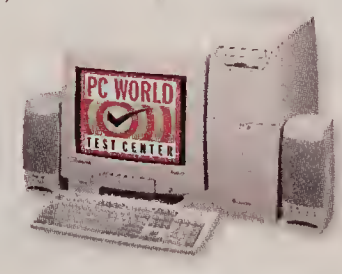
PRO: Excellent documentation, nice design

CON: Drive bays can be tough to access

With a price drop of more than $100, the $2735 Gateway 2000 G6-233 steps up a spot on our chart and becomes an even better value for the performance-minded buyer than it was last month. Posting a PC WorldBench score of 251, this Pentium II-233 minitower provides good performance, within about 4 percent of the speed of the average Pentium II-266.

The G6-233 comes well appointed with 64MB of EDO DRAM and 512K of secondary cache. Our test unit included a 16-bit Ensoniq Audio PCI Wavetable sound card and Altec Lansing ACS 410 speakers with a subwoofer. The Altec Lansings sound good, but the Boston Acoustics speakers we tested with the Gateway 2000 G6-300XL in spot five are better—especially if you use your computer to play music and games.

You also get a 3.2MB Ultra DMA hard drive and a 56-kbps x2 modem, as well as a nice selection of software, including Microsoft Office 97 Small Business Edition, Microsoft Encarta 97, and a number of games. Gateway recently replaced the PCI graphics card in this PC with an AGP system. In our tests, AGP performs similarly to PCI with standard business applications. Look for our retest of the updated G6-233 next month.



Gateway 2000 G6-233

The G6-233 offers plenty of expansion space. Large thumbscrews make getting inside the case easy, and we like the color-coded I/O ports. Drawbacks are minor: We had to undo thumbscrews on the case's right side panel to remove the drive cages, and the hard disk occupies the most accessible of the internal bays.

Gateway clearly did its homework in putting the documentation together. The manuals are thorough, clearly written, wonderfully illustrated, and printed on glossy paper. Our readers rank Gateway's system reliability as only fair, but support receives top scores; you get a three-year warranty on parts and labor, plus round-the-clock, toll-free technical help. ▶

what WORKS for you?

PERFORMANCE. RELIABILITY. VALUE.

Panasonic PanaSync™ monitors give you exactly what you need to get the job done. Our monitors have been designed with today's business environment in mind. If you're looking for a solid, feature rich monitor, try our S15, S70 or S21– ready for virtually any application. If you're looking for a space saving Liquid Crystal Display, take a look at our LC40, it's an amazing achievement. With a full screen display measuring less than 3" deep, it features a sharp, brilliant picture. And when it comes to performance and affordability we've set a new industry standard.

Model	S15	S70	S21	LC40
Dot Pitch (mm)	0.27	0.27	0.27	0.2775
Max. Res. NI (H X V)	1280 X 1024	1280 X 1024	1600 X 1280	1024 X 768
H-Scan (kHz)	30 - 67	30 - 70	30 - 95	30 - 61
Viewable Area	13.7"	16.0"	20.0"	14.0"

And if you're concerned about customer support, take a look at our program– it's the most extensive warranty and customer support program in the industry. Our 3-Year Limited Warranty on parts, labor and the CRT, 1-Year On-Site Exchange Program, and 24-Hour, 7-Day Customer Support Hotline, all at no additional cost, adds value you won't get from the competition.

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Circle 166 on reader service card

Practice. Practice. Practice.

At Transmonde Technologies, we work hard to create the best products and deliver the best service possible for our customers. Which is why, for the past seven months, our notebooks have consistently been awarded a place on PC World's Top 20 list of notebook PCs. (To be truthful, we've always been ranked in their top 10).

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- Direct Mail Analysis
- Distribution Agreement
- Launch Schedule & Budget
- Online Marketing Plan
- New Product/Service Development Checklist
- Product Positioning Worksheet
- PR Planning Worksheet
- New Event, Employee, & Product Press Releases
- Telesales Scripts
- Retail Merchandising Budget
- Sales Rep Tracking
- Sales & Marketing Budget
- Trade Show Checklist
- Travel & Logistics Worksheet

Finance & Accounting
- AR/AP Aging Reports
- Balance Sheet
- Break-Even Analysis
- Business Credit Evaluation
- Cashflow Statement
- Cash Receipts Procedures
- Check & Credit Card Procedures
- Financial Statement Analysis
- Income Statement
- Personal Financial Statement
- 3 Year Financial Comparison
- 65 Financing Options

Hiring & Personnel
- Attendance Record
- Background Research Release
- Consulting & Contractor Agreements
- Employer Survival Guide (how to advertise & find people, interview questions, etc.)
- New Employee Orientation
- Non-Disclosure Agreement
- Performance Evaluation
- Offer Letters
- Rejection Letters
- Space Requirements Planning Worksheet

Management & Operations
- Articles of Incorporation
- Disaster Recovery Plan
- Executive Summary
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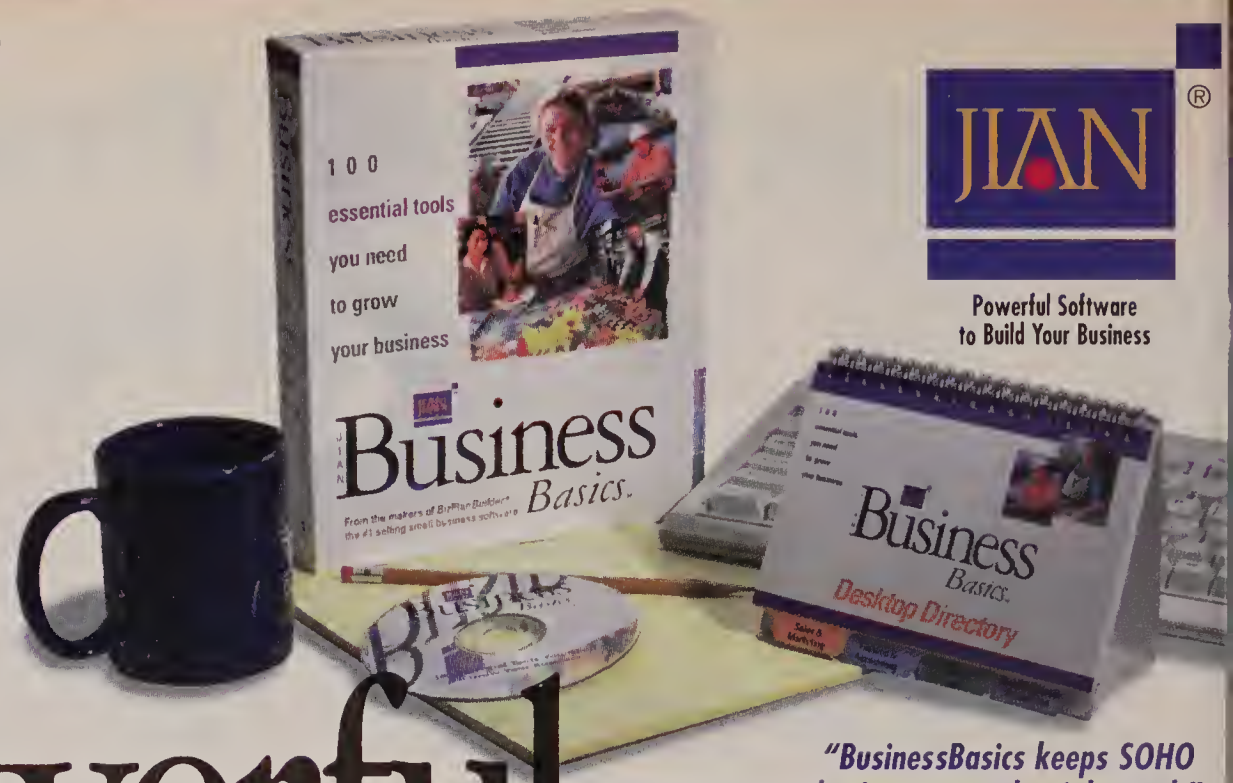

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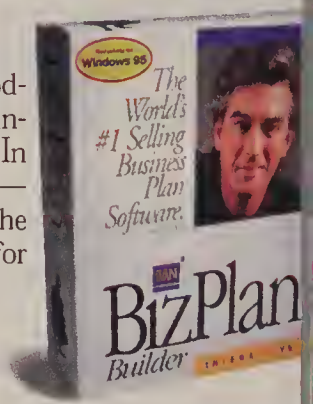

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Requirements: Any 386 PC or higher with Windows 3.1, Windows 95 | *Macintosh 68030 or higher with System 6 or higher* | 4MB RAM | *6MB hard disk space* | CD-ROM (Diskettes Available)

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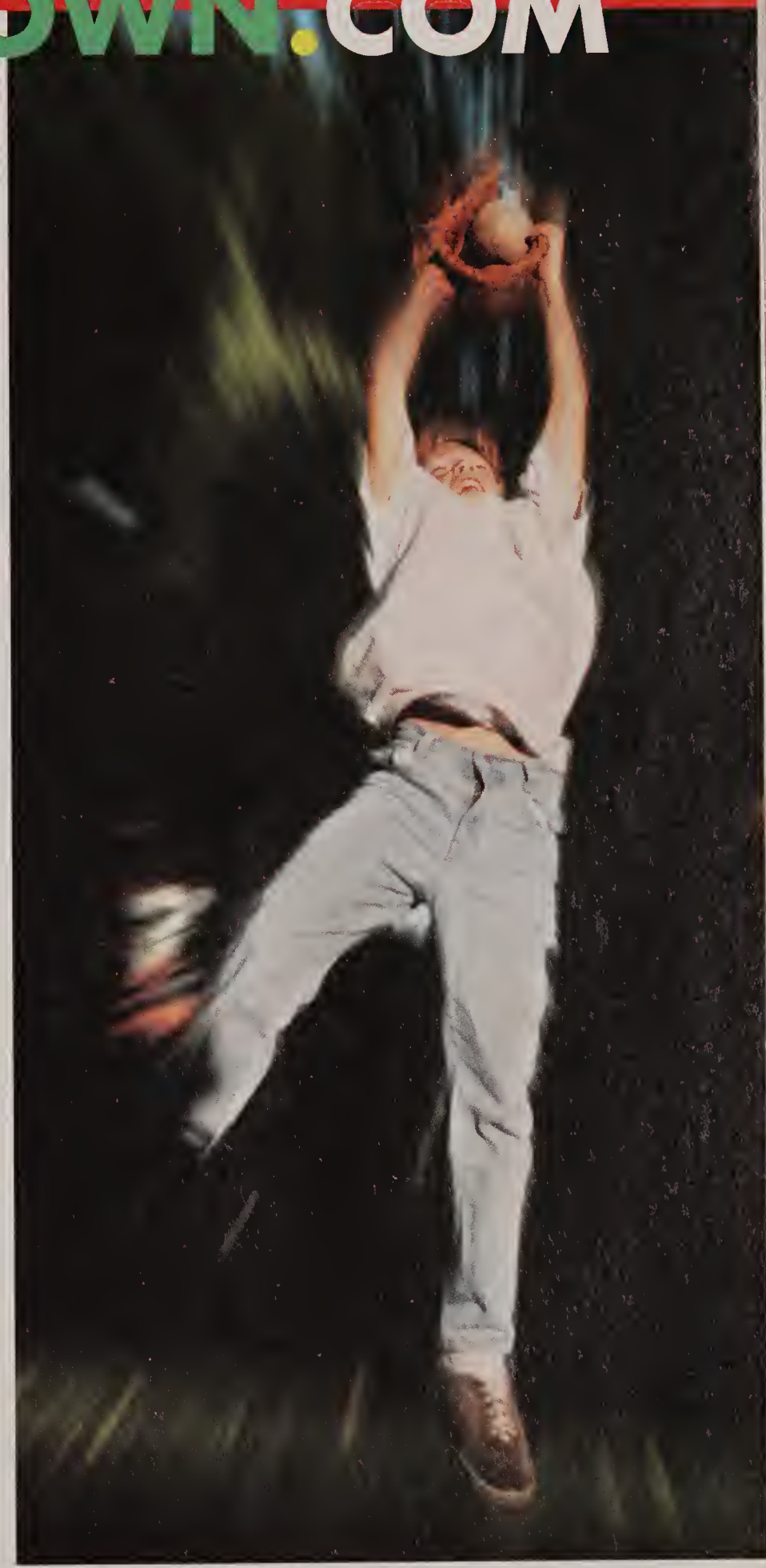

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4 QUANTEX QP6/300SM-3X

PRO: Affordable, generous feature set, best support policies rating

CON: Generic documentation

A combination of top-notch performance, a cheap $2999 price, and a generous feature set earns the Quantex QP6-300SM3x a Best Buy position on this month's Power chart. This minitower sports a Pentium II-300 CPU and extras like a 56-kbps modem at a price that's almost $1100 less than similarly configured systems. In addition, the QP6/300SM-3x scores a PC WorldBench rating of 269, just one point short of the average score for a Pentium II-300 system.

This PC offers high-end components that rival the best. It's rare to find a sub-$3000 system with a 6.4GB hard drive, 64MB of RAM, and a 56-kbps modem. Like all Pentium II-300 computers, the QP6/300SM-3x includes an AGP graphics system. The 17-inch MAG InnoVision monitor that came with our test machine has a good display and very intuitive tools for adjusting color and contrast. The system also includes Microsoft Office 97 Small Business Edition. ▶

Quantex QP6/300SM-3x

TOP 20 POWER DESKTOPS

TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Dell Dimension XPS D266*	Pentium II-266	64	512	264
2	Dell OptiPlex Gxa266*	Pentium II-266	32	512	259
3	Gateway 2000 G6-233*	Pentium II-233	64	512	251
4	Quantex QP6/300SM-3x*	Pentium II-300	64	512	269
5	Gateway 2000 G6-300XL*	Pentium II-300	64	512	272
6	Quantex QP6/266 WS-3x	Pentium II-266	32	512	255
7	Micron Millennia XKU 300	Pentium II-300	64	512	270
8	Gateway 2000 E-3100 PII-266	Pentium II-266	64	512	262
9	Sys Technology Performance 233K6	AMD K6-233	32	512	251
10	DTK Quin-57M/PM233	Pentium MMX-233	64	512	241
11	NMC Expert Pro II	Pentium II-266	64	512	260
12	Sys Technology Performance Pro 266A	Pentium II-266	32	512	264
13	Acma EXP Pro PII 266	Pentium II-266	32	512	258
14	Netis Starburst 266	Pentium II-266	32	512	257
15	Premio FX2 Shadowhawk 266	Pentium II-266	64	512	257
16	Digital Celebris GL-2 6200	Pentium Pro-200	32	256	229
17	Amax GFX Pro 266	Pentium II-266	32	512	258
18	Everex StepStation2	Pentium II-266	32	512	257
19	Digitron PS4000	Pentium II-266	32	512	259
20	Nova PII-266	Pentium II-266	64	512	260

*Best Buy

Application test times in minutes

Word 7.0 for Windows 95
Excel 7.0 for Windows 95
Picture Publisher 6.0 for Windows 95
Paradox 5.0 for Windows
WordPerfect 6.1 for Windows
1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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Quantex's documentation boasts serviceable illustrations but provides only generic PC information. However, the company's support policies are among the best in the business: They include a three-year warranty for parts and a one-year labor warranty, which are now the industry standard, plus 24-hour toll-free technical help. In our fax-back survey, *PC World* readers say the quality of Quantex support and the reliability of its systems are both good.

5 GATEWAY 2000 G6-300XL

PRO: Blazingly fast, high-quality 19-inch monitor, great sound, very expandable

CON: Expensive, fair reliability rating

If you're looking for the fastest PC you can buy, you're gonna love the Gateway 2000 G6-300XL. From its Pentium II-300 CPU, which kicked it along to a record-setting PC WorldBench score of 272, to a big 19-inch monitor and AGP graphics, this system is state-of-the-art. And you pay for the privilege—$3799, one of the highest prices on our chart.

The first thing we noticed about the G6-300XL was the crisp, impressive EV900 display that Gateway sent with it. It's built around a Hitachi tube and has a whopping 18-inch viewable area and a footprint smaller than some 17-inchers'. Driving this wonderful display is an AGP version of the STB Velocity 128.

The G6-300XL also sounds good. An Ensoniq ESI370 Audio PCI card and Boston Acoustics speaker/subwoofer combo delivers quality good enough to please even audiophiles. Only one caveat: The Ensoniq card steals from main memory to store its wavetable; the user may opt to use either 2MB, 4MB, or 8MB tables. This problem isn't major considering the machine's 64MB of RAM, but you may see a slight degradation in performance when a lot of apps are running.

Like all Gateway 2000 systems, the G6-300XL is well built. The full-size tower has plenty of elbowroom inside for repairs and upgrades; you'll find more available drive bays than you'll ever use. Not that you'll need to expand storage right away—the fast 8.4GB Ultra DMA IBM drive and bus-master IDE controller should hold you for a while. The G6-300XL comes with the same software as the Gateway G6-233 in spot three: Microsoft Office 97 Small Business Edition, Microsoft Encarta 97, and a number of games. Rounding out the system are a Telepath 56-kbps x2 modem and a 12X–24X CD-ROM drive.

Gateway 2000 G6-300XL

Gateway's support package includes a three-year warranty on parts and labor, plus round-the-clock tech support. Our readers rate Gateway's support quality as among the best but system reliability as only fair. The illustrated documentation is well written, and loads of help is also available on Gateway's Web site.

New This Month

The following PCs made our Power Desktops chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

8 GATEWAY 2000 E-3100 PII-266

PRO: Fast; SCSI CD-ROM drive and hard drive

CON: Fair reliability rating, no sound card or modem at this price

The $2889 Gateway 2000 E-3100 PII-266 is fast—and the combination of speed, excellent support policies, and top-notch support quality help it claim a position on our chart. The system doesn't come with a sound card or a modem; these omissions and the company's reliability rating of only fair prevent this machine from earning a higher spot.

Still, the E-3100 PII-266 has significant strengths. The stylish minitower comes standard with 64MB of RAM and a 4GB Ultra Wide SCSI hard drive. The small ATX motherboard includes an AGP slot, though the video card in our test system is a standard PCI board from ATI. The 17-inch monitor is sharper than most, and the on-screen controls are intelligently designed. The CD-ROM drive is a SCSI 12X Plextor—one of the best drives in its class.

Gateway E-3100 PII-266

The documentation is well written, but the motherboard manual that came with our machine was for a different model than the one in the system. Gateway's three-year warranty covers parts and labor and includes free on-site service; phone support is available around the clock.

13 ACMA EXP PRO PII 266

PRO: Good documentation, Zip drive

CON: No software bundle, some internal clutter

At $2899, the latest minitower from Acma offers a few exemplary features, most specifically a Zip drive for extra storage and a 3Com/U.S. Robotics Sportster 56-kbps modem for speedier Internet connections. But the EXP Pro PII 266 is missing some key features that would place it higher on the chart: It doesn't come with extra software, the interior of the system is cluttered, and the company's support policies are subpar. And finally, although the system's performance is good, it's slightly below-average for the PII-266 processor class in our PC WorldBench tests.

Acma EXP Pro PII 266

The EXP Pro's design is a cut above your typical steel cube but not remarkable. We did like the thoughtfully designed hatch door on the front of the unit, covering the floppy drive, the 12X–16X Toshiba CD-ROM drive, and the Zip drive. The system case has a little more flex than we like to see. Large thumbscrews offer easy access to the interior, and with the Sportster modem and Sound Blaster AWE64 sound card installed, our system was left with two empty ISA slots. We had some difficulty locating the two free RAM slots; they're trapped behind the motherboard cables and the hard drive.

Acma provides well-organized, clear documentation for this desktop. System and component information come in a handsome, sturdy box and are presented in file-folder fashion, with index tabs for quick reference. The company covers parts for three years and labor for ▶

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one—standard for the industry. Acma's toll-free telephone support is a plus, but it's available just 10 hours a day, and only on weekdays. We don't have enough information from our reader fax-back survey to report on the reliability of Acma systems or the quality of its support.

14 NETIS STARBURST 266

PRO: Solid components, crisp monitor, good performance for its processor class

CON: Fair support policies, documentation isn't comprehensive

For a Pentium II-266 system with 32MB of RAM, the Netis Starburst 266 is a good deal: With a $2390 price tag, it's almost $750 cheaper than similarly configured systems. However, Netis's mediocre support policies keep this system relegated to the lower half of our chart.

Netis Starburst 266

The Starburst is a basic unit. It probably comes with everything you need, but it doesn't offer the last word in components. For example, the Matrox Millennium graphics card included with this machine pumps sharp graphics onto a clear 17-inch monitor—but the Millennium no longer holds a position on our Top 10 Graphics Boards chart. Similarly, the 3Com/U.S. Robotics Sportster 33.6-kbps modem used to rank on the Top 10 Modems chart, but it has been ousted by faster modems. The Starburst 266 comes with a 3.1GB hard drive—the smallest we've seen in a Pentium II-266 computer. The speakers that ship with the unit are generic, and the system does not come with any additional software.

The Starburst looks a little jazzier than your standard putty-colored box. The case is wide, shorter than your average minitower, and has decorative slats on the front. Inside, you'll find a relatively clutter-free environment: It's easy to access the open ISA and PCI slots, although the two available SIMM sockets are tucked behind a cable.

Support for the Starburst could be better. The user guide that comes with the system is a slim, pamphlet-size booklet with illustrations but no index. The company offers only a one-year parts warranty, though labor is covered for three years. Toll-free phone support is available just 10 hours on weekdays and Saturdays. We don't have enough information in our reader fax-back survey to rate the quality of the support. Overall, this is a system to consider if you want a fast processor but don't want to spend a lot of money, and you're willing to live with the company's unknown support record and without cutting-edge components.

17 AMAX GFX PRO 266

PRO: Loaded, second processor socket

CON: Overpriced, minimal phone support

At $3099, the Amax GFX Pro 266 isn't the cheapest or even one of the best values among Pentium II-266 systems. But with very good PC WorldBench performance and a substantial set of features, this machine earns a place on our chart.

The GFX Pro 266 system's finest asset is its bundled hardware. The sizable list of extras includes a 12X–24X CD-ROM drive, a 3Com/U.S. Robotics 56-kbps modem, and oversize speakers with good sound. The 100MB Zip drive is an exceptionally nice bonus for those users who often move images or other large data files from one PC to another. On the other hand, the GFX's 3.2GB EIDE hard drive is among the smallest provided by Pentium II-266 systems to date.

Amax GFX Pro 266

The motherboard has a slot for a second Pentium II processor and enough SIMM slots to hold a maximum 512MB of RAM, so this system could serve as a bare-bones workstation if you want to upgrade later.

Amax's warranty covers parts for three years and labor for one. And at a time when many vendors are moving toward 24-hour, seven-day telephone technical support, Amax weighs in with a meager 9.5 hours on weekdays only. We have received insufficient reader responses to assess the company's support or its system reliability.

18 EVEREX STEPSTATION2

PRO: Very good speed, 24-hour tech support, 56-kbps modem

CON: Overpriced, mediocre speakers

This nondescript Pentium II-266 minitower is a one-size-fits-all power system. Top-notch speed, lots of room for expansion, and good-quality multimedia components are important for a chart-ranking PC, but the StepStation2's steep $3075 price pushes it down to the bottom half of the power ranks. It delivers multimedia with its 12X–24X Toshiba CD-ROM drive and Sound Blaster 32-bit audio, but these components are supported by mediocre, no-name speakers. Inside, there's plenty of room for expansion—four empty drive bays and four open PCI slots. Unfortunately, you'll have to remove the CPU in order use the free externally accessible 3.5-inch drive bay.

Everex StepStation2

We encountered a couple of minor problems with the review system straight out of the box. First, the monitor's power cord is designed to plug into a socket on the back of the minitower instead of into the wall, but the necessary socket was absent from our machine. Also, when we first started up the system, Win 95 could not find the mouse even though it was plugged into the proper connector. Curiously, Win 95 then prompted us to install new hardware drivers for the PCI bus and the monitor (which we did). Once we restarted the system, everything was fine, but that kind of problem could be disconcerting to someone who just shelled out more than $3000 for a new PC.

All in all, the StepStation2 is acceptable in most areas. It has good support policies and good speed, but it's a little pricey for what you get. ▶

Beyond the Top 20: Online

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Power Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

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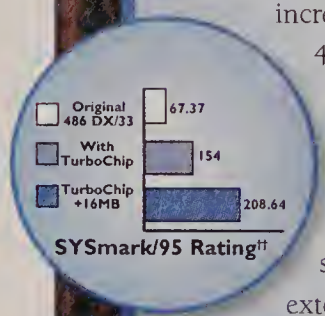

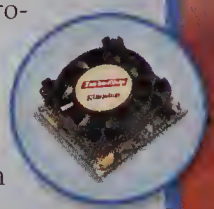

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15B	15"/13.7"	1024x768	Digital	.28	$249
17MS	17"/15.7"	1024x768	Digital	.39	$389
15G+	15"/13.7"	1280x1024	Digital On-Screen	.28	$299
17B+	17"/15.7"	1280x1024	Digital On-Screen	.28	$499
17S	17"/15.7"	1280x1024	Digital On-Screen	.27	$599

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PC WORLD

TOP 20 BUDGET DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (9/15/97)	CPU	Comments
1	Dell Dimension M200a 800/338-8542 www.dell.com	1	June 97	$1749	Pentium MMX-200	$50 off, quick, well-rounded, 56-kbps modem, top reliability and support ratings.
2	Quantex QP5/200 SM-1 800/896-4898 www.quantex.com	3	Oct 97	$1699	Pentium MMX-200	$100 price trim on fast machine with multimedia, 56-kbps modem.
3	Quantex QP5/233 M-3 800/896-4898 www.quantex.com	–	NEW	$1949	Pentium MMX-233	Standard-looking PMMX-233 minitower, inexpensive, good support policies.
4	Micro Express MicroFlex-K5/5166D 800/989-9900 www.microexpress.net	8	Aug 97	$1259	AMD K5-PR166	Generic system has good video card, excellent support policies.
5	CyberMax PowerMax 800/437-4596 www.cybmax.com	6	Sept 97	$1349	AMD K6-166	Fast, low-cost AMD K6 tower drops $50; support available around the clock.
6	Micro Express MicroFlex-F210A 800/989-9900 www.microexpress.net	–	NEW	$1349	AMD K6-200	Overclocked system is superfast for its processor; top-notch graphics card.
7	Dell OptiPlex Gn+233 800/388-8542 www.dell.com	5	Nov 97	$2182	Pentium MMX-233	Integrated ethernet, no open drive bays, not as fast as some PMMX-233s.
8	Micro Express MicroFlex-686/P200+LC 800/989-9900 www.microexpress.net	12	Aug 97	$1479	Cx6x86-PR200+	$20 price drop on fast multimedia Cyrix-based PC with modem.
9	Polywell Poly 500QX 800/999-1278 www.polywell.com	16	June 97	$1250	AMD K5-PR166	$145 price drop and CD-ROM drive upgrade on this former Best Buy.
10	Gateway 2000 GP5-233 800/338-0169 www.gateway.com	–	Sept 97	$2188	Pentium MMX-233	$276 price trim brings system onto Budget chart; full multimedia, modem.
11	ProGen Atlas X 200 888/776-9595 www.progen.com	10	Aug 97	$1509	Pentium MMX-200	Fleet-footed, $40 off, speaker with subwoofer; no weekend support.
12	Seanix Baby Grand-CS 800/252-1190 www.seanix.com	19	Nov 97	$999	Pentium MMX-166	Supercheap starter PC has sound and modem; slow CD-ROM drive.
13	Kingdom Pinnacle PV-200+ 800/385-3436 www.kingdomcomputers.com	14	Nov 97	$1297	Cx6x86-PR200+	Inexpensive multimedia PC has modem, home software, surge suppressor.
14	Micro Express MicroFlex-MMX/2000D 800/989-9900 www.microexpress.net	17	July 97	$1699	Pentium MMX-200	Quick PMMX-200 has full multimedia, modem; $1499 P-166 is also a good buy.
15	USA Flex Performer 800/872-3539 www.usaflex.com	9	Oct 97	$1899	Cx6x86MX-PR200	Fast PC comes with 56-kbps modem, 17-inch monitor; unknown reliability record.
16	Kingdom Pentium MMX 200 Home & Office 800/385-3436 www.kingdomcomputers.com	15	July 97	$1897	Pentium MMX-200	$100 off, fast, well designed, full multimedia, modem, good home-office software.
17	ProGen Discover MPEG P166 888/776-9595 www.progen.com	–	Mar 97	$999	Pentium-166	Ties with Seanix for least expensive; slowest performance on chart.
18	DirectWave MVP VC2Desk233 800/882-8108 www.directwave.com	7	Nov 97	$2199	Cx6x86MX-PR233	$100 increase, fastest on chart, choice of business suites; a lot for the money.
19	Multiwave P-200 MMX 800-234-3358 www.mwave.com	–	June 97	$1795	Pentium MMX-200	Tremendous $430 price cut brings PC onto chart; 17-inch monitor, surge protector.
20	Digital Venturis FX-2 5166M 800/722-9332 www.windows.digital.com	–	Oct 97	$1575	Pentium MMX-166	Average performance for its class; no modem or sound card.

Best Buy See features chart, page 314; test report, page 318.

[1] Insufficient data to give a rating.

LOOKING FOR BARGAIN-BASEMENT PRICES? Check out this month's Top 20 Budget Desktops. Prices average $300 less than they did this time last year, and two systems cost less than $1000: the Seanix Baby Grand-CS, based on a Pentium MMX-166 chip, and the ProGen Discover MPEG P166, a standard Pentium-166 machine. Several others come close to that price, including the $1259 Best Buy Micro Express MicroFlex K5/5166D, the $1250 Polywell Poly 500QX in spot nine, and the new $1228 Acer Aspire 1250, an AMD K6-166 system that didn't quite make the list. For more on the Acer and other machines that didn't earn a chart position, see PC World Online (www.pcworld.com/t20pcs).

SCORECARD

★ Overall rating	Price	Vendor's system reliability	Features and design	PC WorldBench score/performance	Vendor's support quality/policies	Reader service number
86	average	best	very good	219/good	best/best	659
84	average	good	very good	230/good	good/best	660
82	average	good	very good	236/very good	good/best	661
80	inexpensive	[1]	very good	208/satisfactory	[1]/best	662
80	inexpensive	[1]	very good	223/good	[1]/best	663
80	inexpensive	[1]	good	247/very good	[1]/best	664
79	expensive	best	good	233/good	best/best	665
78	inexpensive	[1]	very good	217/good	[1]/best	666
78	very inexpensive	[1]	good	213/good	[1]/good	667
78	expensive	fair	very good	240/very good	best/best	668
77	inexpensive	[1]	very good	232/good	[1]/fair	669
77	very inexpensive	[1]	good	200/satisfactory	[1]/poor	670
77	inexpensive	[1]	very good	207/satisfactory	[1]/good	671
76	average	[1]	good	233/good	[1]/best	672
76	average	[1]	outstanding	235/good	[1]/best	673
76	average	[1]	outstanding	233/good	[1]/good	674
75	very inexpensive	[1]	good	196/satisfactory	[1]/fair	675
75	expensive	[1]	outstanding	254/outstanding	[1]/best	676
74	average	[1]	very good	235/good	[1]/poor	677
74	average	good	satisfactory	214/good	[1]/good	678
Scorecard weightings ▶	Price 25 percent	Reliability 25 percent	Features 20 percent	Performance 15 percent	Support 15 percent	All products: 906

This Month's Best Buys

1 DELL DIMENSION M200A

PRO: Inexpensive for a PMMX-200, excellent support, 56-kbps x2 modem

CON: Monitor could be sharper

The Dell Dimension M200a holds the number one spot for the third month in a row. This machine offers all the essentials: solid performance, a 12X–24X CD-ROM drive, integrated sound and graphics, a 56-kbps x2 modem, and superb support and system reliability ratings. Other Pentium MMX-200 PCs deliver greater speed than the M200a. With a PC WorldBench score of 219, the M200a is about 5 percent slower than the average PMMX-200 system, but most PMMX-200's have 32MB of RAM, while the M200a has only 16MB. If you regularly have more than a couple of programs open at once, spring for the extra $99 or so that it will take to buy the M200a with 32MB of RAM.

Dell Dimension M200a

With Microsoft Office 97 Small Business Edition included, this system is a good no-nonsense choice for the home or small office. However, we found that the 15-inch LS monitor included with our test unit lacked sharpness. Upgrading to the very good 800LS Trinitron monitor costs a mere $49 extra, and the new 1000LS 17-incher costs only $119 more.

The M200a's clean interior makes upgrading easy. Dell's documentation is well illustrated and indexed and has a handy glossary. But more than anything else, it's the company's top support and system reliability ratings (derived from our fax-back polls) that consistently keep Dell systems so high on our charts.

2 QUANTEX QP5/200 SM-1

PRO: Fast, affordable

CON: Some cable clutter

With a $100 price drop to $1699, the Quantex QP5/200 SM-1 earns a number two Best Buy. This machine delivers better-than-average Pentium MMX-200 performance, scoring a commendable 230 on our PC WorldBench test suite. If you have a few more dollars to spend, the Quantex QP5/166 SM-3 with a Pentium MMX-166 processor and a larger monitor is also a good buy; it costs $200 more than the QP5/200. At $2199, the QP5/233 SM-3 with a Pentium MMX-233 chip is worth considering too—it has good performance for its processor class and comes well equipped with features such as a 4GB hard drive, a 17-inch monitor, and the high-quality Matrox Millennium II graphics card with 4MB of WRAM.

The QP5/200 SM-1 offers many rich features. Inside, you'll find the impressive Matrox Mystique 220 video adapter with 4MB of fast SGRAM. You also get Matrox's Rainbow Runner video-capture ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 BUDGET DESKTOPS — STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension M200a*	Pentium MMX-200	16	512	3.2	integrated	2/DRAM	15/13.8	.28	12X-24X
2	Quantex QP5/200 SM-1*	Pentium MMX-200	32	512	3.2	Matrox Mystique 220	4/SGRAM	15/13.9	.28	12X-16X
3	Quantex QP5/233 M-3*	Pentium MMX-233	32	512	4.3	STB Nitro 3D	4/EDD DRAM	17/16.1	.28	12X-24X
4	Micro Express MicroFlex-K5/5166D*	AMD K5-PR166	32	512	2.1	ATI PC2TV	2/WRAM	15/13.8	.28	12X-16X
5	CyberMax PowerMax*	AMD K6-166	32	512	3.2	Matrox Mystique 22D	4/SGRAM	15/13.8	.28	12X-16X
6	Micro Express MicroFlex-F210A	AMD K6-200	32	512	3.2	ATI 3D Pro Turbo PC2TV	4/SGRAM	15/13.8	.28	12X-16X
7	Dell OptiPlex GN+233	Pentium MMX-233	32	256	3.2	integrated S3 Trio64 V2	2/VRAM	15/13.8	.25	12X-24X
8	Micro Express MicroFlex-686/P200+LC	Cx6x86-PR20D+	32	512	4	STB Velocity 3D	4/VRAM	17/15.8	.28	12X
9	Polywell Poly 500QX	AMD K5-PR166	32	512	4.1	Diamond Stealth 3D 2000	4/EDD DRAM	15/13.8	.28	12X-24X
10	Gateway 2000 GP5-233	Pentium MMX-233	32	512	2	STB Virge 4MB 3D PCI	4/VRAM	17/16	.28	12X-24X
11	ProGen Atlas X 200	Pentium MMX-2DD	32	512	3.2	Matrox Millennium	4/WRAM	17/15.8	.26	12X-16X
12	Seanix Baby Grand-CS	Pentium MMX-166	16	512	1.6	S3 Trio/Vision 2	2/EDO DRAM	14/13.2	.28	12X-16X
13	Kingdom Pinnacle PV-200+	Cx6x86-PR20D+	16	512	2.6	Hercules Terminator 3D	2/DRAM	15/13.8	.28	12X-24X
14	Micro Express MicroFlex-MMX/2000D	Pentium MMX-2DD	32	512	5	STB Velocity 3D	4/VRAM	17/15.8	.26	12X-16X
15	USA Flex Performer	Cx6x86MX-PR200	32	512	4.1	Matrox Millennium	4/WRAM	17/16.1	.28	12X-16X
16	Kingdom Pentium MMX 200 Home & Office	Pentium MMX-20D	32	512	3.2	Hercules Dynamite 128	4/MDRAM	17/15.8	.28	12X-16X
17	ProGen Discover MPEG P166	Pentium-166	16	512	1.6	Matrox Millennium	2/WRAM	15/14	.27	12X-16X
18	DirectWave MVP VC2Desk233	Cx6x86MX-PR233	32	512	6.4	Matrox Millennium	4/WRAM	17/16.1	.26	12X-24X
19	Multiwave P-200 MMX	Pentium MMX-200	32	512	2.1	Matrox Millennium	4/WRAM	17/16	.26	12X
20	Digital Venturis FX-2 5166M	Pentium MMX-166	16	256	2.1	integrated	2/SGRAM	15/13.9	.28	12X-16X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

software and TV Tuner module. The 15-inch MAG InnoVision monitor provides good image quality and easy-to-use controls. Audio is handled capably by a 16-bit Ensoniq sound card and a pair of Altec Lansing ACS 45 speakers. The 56-kbps fax-modem, which uses the K56flex standard from Rockwell-Lucent, offers the potential for swift Internet downloads. The software bundle includes Microsoft Office 97 Small Business Edition and a nice selection of games, among them Demolition Derby, a car-racing CD-ROM.

As with other Quantex systems that we've seen, the QP5/200's case is sturdy and the interior designed for expandability. Our test unit had plenty of space for adding RAM, expansion cards, and drives. Our only complaint was with the few stray cables left hanging loose.

Quantex QP5/200 SM-1

The system manual is serviceable but generic—it's the same manual that comes with most Quantex PCs. Toll-free technical support is available around the clock. Our anonymous calls got responses within 5 minutes and revealed a friendly, patient support staff. The warranty covers parts for three years and labor for one, standard in the industry today. The current collection of responses from our ongoing fax-back survey gives Quantex a rating of good for both system reliability and support quality.

3 QUANTEX QP5/233 M-3

PRO: Great software bundle, inexpensive for what you get, lots of open DIMM and SIMM sockets

CON: Keyboard feels spongy, weak documentation, generic monitor

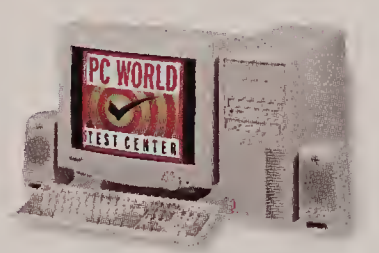
You've heard the expression "Show me the money." With Quantex's QP5/233 M-3, you won't have to show too much. The QP5/233 M-3 is not only quick and feature rich, it's *cheap:* At $1949, it costs a few hundred dollars less than some similarly configured systems, like the Gateway 2000 GP5-233 in spot ten. But you don't get just inexpensive silicon—Quantex configures this minitower with lots of power and industry-standard components.

With a PC WorldBench score of 236, the QP5/233 M-3 is a little faster than the aver-

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max. RAM (MB)	Maximum secondary cache (K)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56 [1]	integrated Sound Blaster 16	minitower	64	512	1	3/1	6	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [2]	Ensoniq Audio S5016	minitower	256	512	4	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56 [2]	Ensoniq ESI370 Audio PCI	minitower	256	512	4	2/1	4	3/1	24	Sat., Sun.	BBS, WWW
33.6	Superior Sound32	minitower	128	512	4	3/2	3	4/4	24	Sat., Sun.	WWW
33.6	Ensoniq Audio PCI Wavetable	tower	384	512	5	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
33.6	Super Sound 32/Opti MPU-401	minitower	256	512	2	3/0	3	4/4	24	Sat., Sun.	WWW
–	integrated Vibra 16	desktop	512	256	1	0/0	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Sound Blaster AWE64	minitower	512	512	2	2/3	3	4/4	24	Sat., Sun.	WWW
33.6	Supersound Origins 3D	minitower	128	512	4	3/0	4	3/5	12	Sat.	BBS, WWW
56 [1]	Ensoniq Audio PCI Wavetable	minitower	256	512	1	3/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Progen AWE32 PnP 3D	minitower	256	512	4	3/1	4	3/1	9	–	BBS, WWW
33.6	Ensoniq Audio ES1B6B PCI	minitower	128	512	2	3/1	3	varies/[3]	9	–	–
33.6	Ensoniq Audio PCI	minitower	256	512	4	2/3	4	3/1	13	Sat.	WWW
33.6	Sound Blaster 32 IDE PnP	minitower	192	512	4	3/0	2	4/4	24	Sat., Sun.	WWW
56 [1]	Ensoniq Audio PCI 9718	minitower	256	512	4	3/1	3	3/3	24	Sat., Sun.	BBS, WWW
33.6	Schubert 3D	minitower	128	512	3	3/3	4	3/1	13	Sat.	WWW
33.6	ESS/6868PnP	minitower	128	512	2	3/1	4	3/1	9	–	BBS, WWW
56 [2]	Sound Blaster AWE32 PnP	minitower	256	512	2	4/0	4	3/3	24	Sat., Sun.	BBS, WWW
33.6	Ensoniq Soundscape Vivo	minitower	512	512	2	3/1	4	1/1	10	Sat.	BBS
–	–	compact	256	256	2	1/0	3	3/1	24	Sat., Sun.	BBS, WWW

[3] Five years on motherboard, memory, video, and CPU; three years on other parts.

age Pentium MMX-233 PC. And this QP5/233 has a number of features we'd expect with more expensive machines, including a 56-kbps modem and a 12X–24X CD-ROM drive. The QP5/233's graphics subsystem is decent: The STB Nitro 3D card is fast with 2D applications, but it's only fair when it comes to gaming. The monitor, a generic 17-incher, doesn't have a lot of bells and whistles. The Windows 95 keyboard is a bit spongy, but Quantex includes speakers and a microphone with this system, along with a quality Microsoft mouse.



Quantex QP5/233 M-3

Aesthetically, there isn't much to rave about. The QP5/233 M-3's standard minitower case is nearly identical to all the other traditional taupe-colored boxes on the shelf. However, if you plan to upgrade down the road, this Quantex offers plenty of room inside. Our QP5/233 had two open DIMM sockets and two free SIMM sockets—ideal for changing EDO RAM to faster SDRAM. Four free slots for add-in boards plus three open drive bays round out your expansion options.

While Quantex doesn't skimp on features, it does fall short in the documentation it provides. The mediocre manual is the same generic book that's packaged with most Quantex systems. Its screen shots and diagrams help somewhat, but they don't provide much detail on this particular model or processor type. To the company's credit, the standard support policies include a three-year warranty for parts and one year for labor, plus 24-hour toll-free technical support. According to readers, system reliability and the quality of Quantex support are both good.

4 MICRO EXPRESS MICROFLEX-K5/5166D

PRO: Quick, good features for the price

CON: Documentation could be better

If you need good performance, full multimedia, and a modem—and you have only a few bucks to spend—the $1259 Micro Express MicroFlex-K5/5166D could be the PC for you. An example of how AMD's fast, inexpensive K5 and K6 CPUs are provid- ▶

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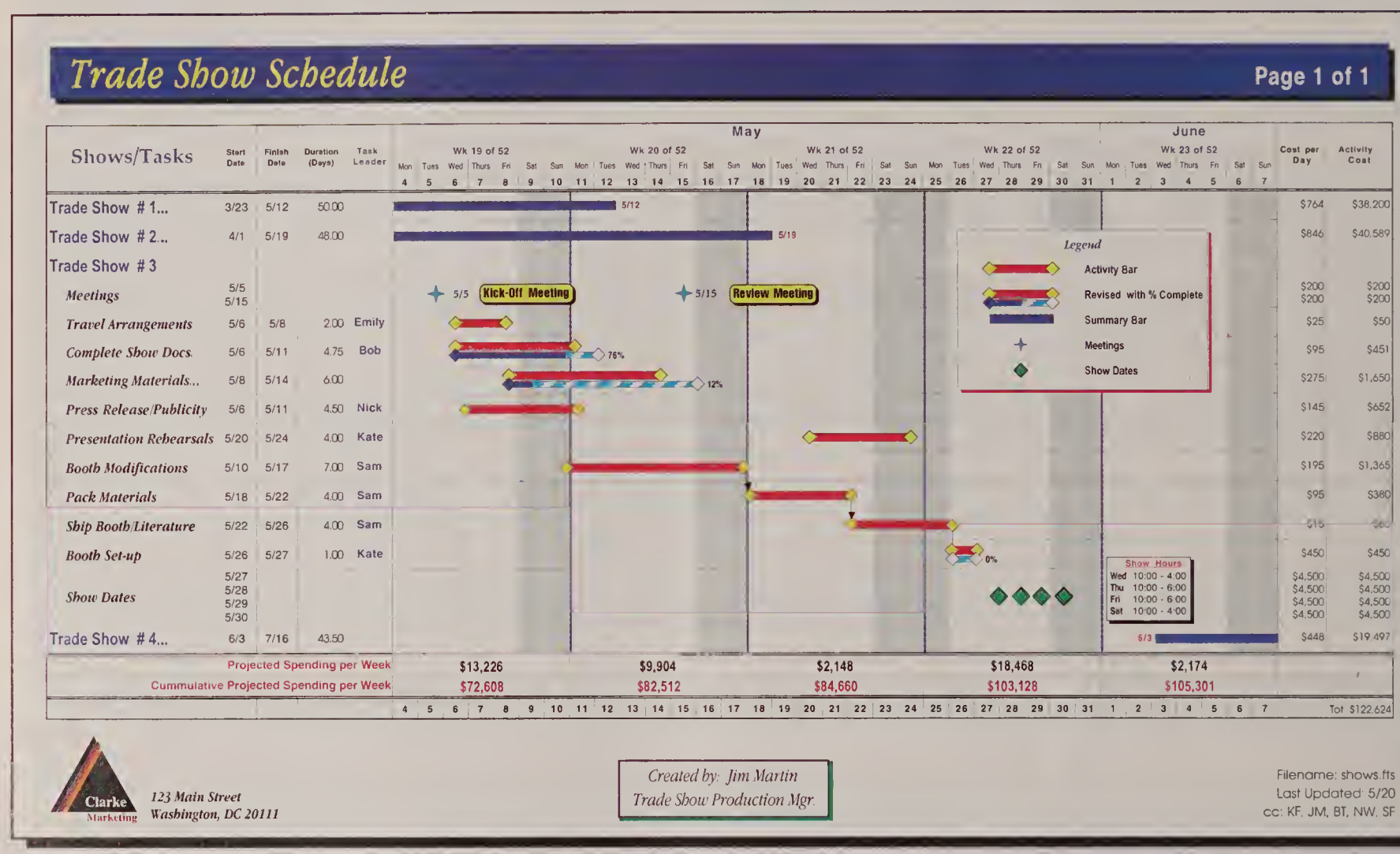

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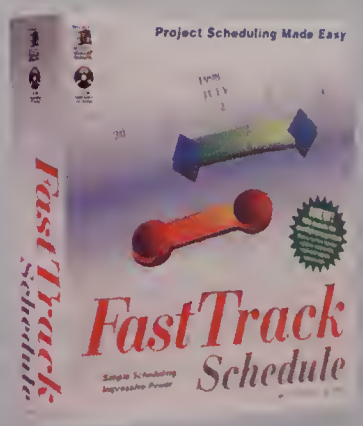

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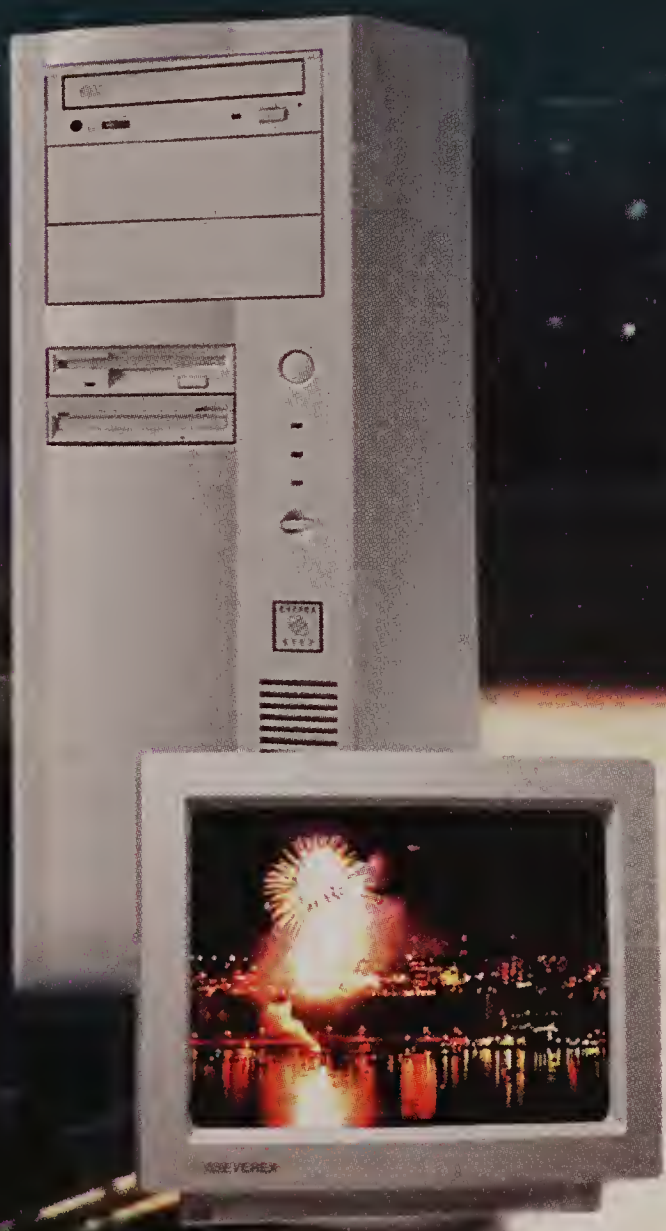

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Circle 107 on reader service card

ing much-needed competition for Intel's processors, this PC costs about $450 less than its Pentium MMX counterparts yet performs on par with them. In fact, it scored 208 on our PC WorldBench test—only about 5 percent slower than the number one Dell Dimension M200a, a Pentium MMX-200 machine, and only 5 percent slower than the average Pentium MMX-166 system. It's also well equipped for the price, with 32MB of RAM, a decent-size hard drive, a generic 33.6-kbps modem, a Superior Sound32 sound card and speakers, and a 15-inch Princeton monitor.

This minitower is nicely designed, with a clearly labeled on/off switch and an easily removable cover. The interior is one of the cleanest we've seen—no cable clutter to speak of, making it easy to access the three free slots and the four available memory sockets.

MicroFlex-K5/5166D

You get separate booklets for Windows 95 and the peripherals but no system-specific guide. If you already know how to set up a PC, these manuals are sufficient; if not, they won't help much. Technical support is available toll-free 24 hours a day, and Micro Express's four-year parts and ▶

TOP 20 BUDGET DESKTOPS

TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Dell Dimension M200a*	Pentium MMX-200	16	512	219
2	Quantex QP5/200 SM-1*	Pentium MMX-200	32	512	230
3	Quantex QP5/233 M-3*	Pentium MMX-233	32	512	236
4	Micro Express MicroFlex-K5/5166D*	AMD K5-PR166	32	512	208
5	CyberMax PowerMax*	AMD K6-166	32	512	223
6	Micro Express MicroFlex-F210A	AMD K6-200	32	512	247
7	Dell OptiPlex Gn+233	Pentium MMX-233	32	256	233
8	Micro Express MicroFlex-686/P200+LC	Cx6x86-PR200+	32	512	217
9	Polywell Poly 5000X	AMD K5-PR166	32	512	213
10	Gateway 2000 GP5-233	Pentium MMX-233	32	512	240
11	ProGen Atlas X 200	Pentium MMX-200	32	512	232
12	Seanix Baby Grand-CS	Pentium MMX-166	16	512	200
13	Kingdom Pinnacle PV-200+	Cx6x86-PR200+	16	512	207
14	Micro Express MicroFlex-MMX/2000D	Pentium MMX-200	32	512	233
15	USA Flex Performer	Cx6x86MX-PR200	32	512	235
16	Kingdom Pentium MMX 200 Home & Office	Pentium MMX-200	32	512	233
17	ProGen Discover MPEG P166	Pentium-166	16	512	196
18	DirectWave MVP VC2Desk233	Cx6x86MX-PR233	32	512	254
19	Multiwave P-200 MMX	Pentium MMX-200	32	512	235
20	Digital Venturis FX-2 5166M	Pentium MMX-166	16	256	214

*Best Buy

Word 7.0 for Windows 95
Excel 7.0 for Windows 95
Picture Publisher 6.0 for Windows 95
Paradox 5.0 for Windows
WordPerfect 6.1 for Windows
1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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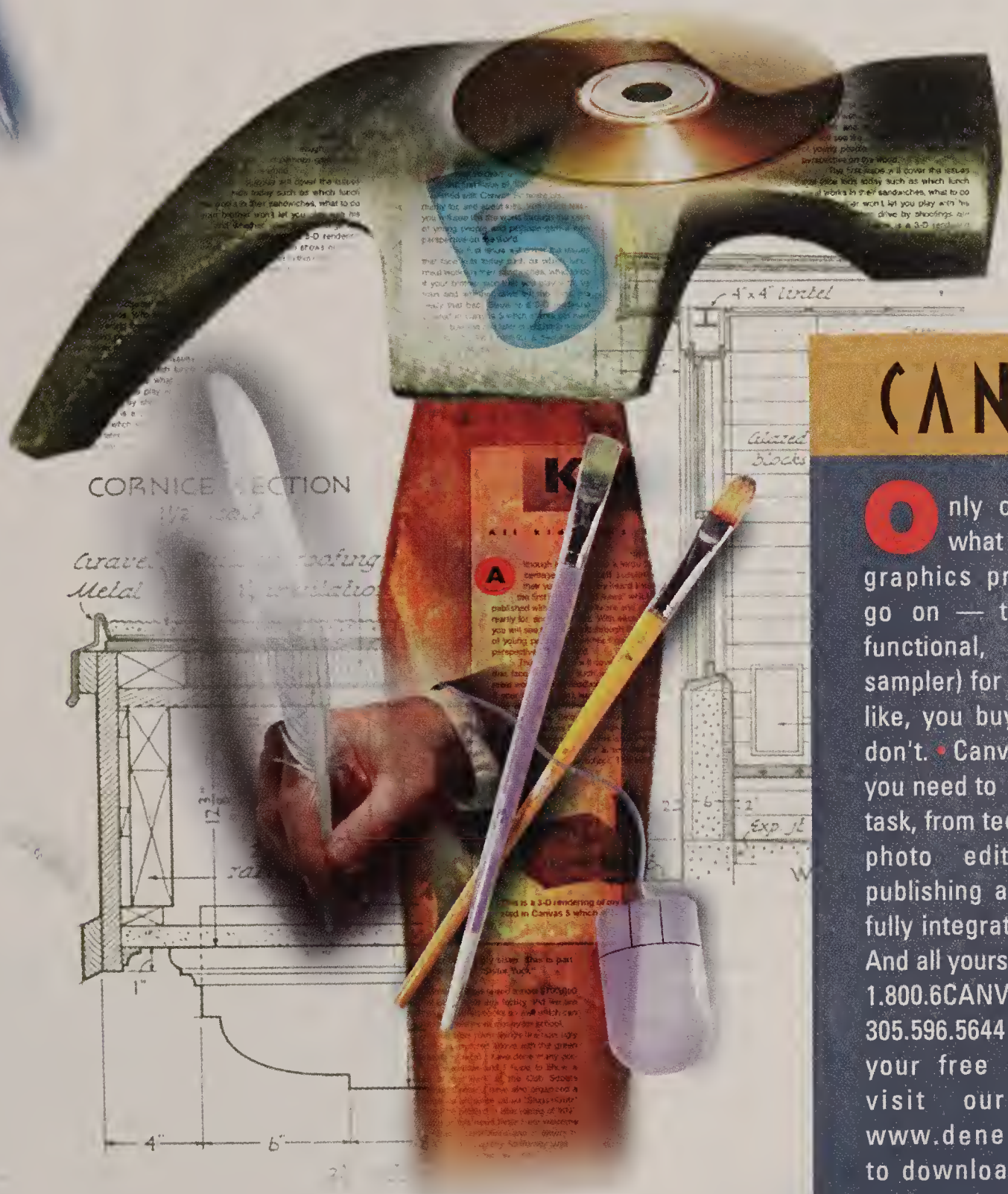

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labor warranty and free on-site service are very attractive. However, we don't have enough data to compile a reliability and support profile for Micro Express. So this PC is best bought by those who have PC savvy or a good MIS department.

5 CYBERMAX POWERMAX

PRO: Good performer, inexpensive, great sound, good support policies

CON: Loose cables

AMD's K6 chip strikes again, this time inside the multimedia-wise CyberMax PowerMax system. Game players and multimedia enthusiasts will want to take a long look at this bargain-priced tower built around the 166-MHz version of AMD's MMX-comparable K6 processor. With a PC WorldBench score of 223, the PowerMax is a match for some Pentium MMX-200 PCs—in fact it's less than 3 percent slower than the average PMMX-200 machine we've tested. But its price is the real clincher: The PowerMax sells for just $1349—almost $400 cheaper than the average Pentium MMX-166 system.

For fast images, the PowerMax comes equipped with a Matrox Mystique 220 graphics card that has 4MB of SGRAM. And though we've often complained about Princeton's 17-inch monitors, the EO50 15-inch model that came with our test system provided a superior picture. CyberMax even throws in a couple of 3D game titles, as well as Corel WordPerfect Suite 7 for the business types among us.

CyberMax PowerMax

The PowerMax includes Ensoniq's Audio PCI sound system, which uses system memory to play wavetable MIDI sounds. This arrangement can slow PC performance by forcing Windows 95 to use virtual memory. (Keep in mind, too, that games requiring a dedicated DOS session can't access the Audio PCI card's wavetable talents.) A pair of Altec Lansing ACS 45 speakers and a subwoofer supply your audio experience with punch.

The rugged chassis leaves lots of room for expansion—five slots and two internal bays are free. But we did find the audio cables for the CD-ROM drive and modem hanging loose. This isn't a major concern, but the ends should have been tied off. For adding RAM, four SIMM sockets and one DIMM socket are available.

The user guide provides little information about the overall system, leaving you with just the component manuals. CyberMax's support policies are strong, however, with a three-year warranty on parts and one-year coverage on labor, round-the-clock toll-free technical support, Internet help pages, and one year of free on-site service. However, we lack enough data from our fax-back surveys to assess the quality of CyberMax's support and system reliability.

MicroFlex-F210A

New This Month

The following PC made our Budget Desktops chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

6 MICRO EXPRESS MICROFLEX-F210A

PRO: Inexpensive, fast, excellent support policies

CON: CPU is overclocked

With a $1349 price tag, the Micro Express MicroFlex-F210A is one of the cheapest systems on our chart. But it wasn't the price that surprised us—it was the performance. This is the fastest AMD K6-200 system we have tested: The average PC WorldBench score for a system in this class is 238, but the MicroFlex-F210A scores a whopping 247. That's easily as fast as some Pentium II-233 and AMD K6-233 systems we've reviewed.

What makes this PC so quick? The system is overclocked. Basically, that means Micro Express installed an AMD K6-200 CPU and pushed its clock speed up, so it performs more like an AMD K6-233. Although overclocking will make your PC run faster, it can also cause problems. Lockups, overheating, system crashes, and other glitches both small and large can occur when CPUs are run faster than their rated speed. Micro Express says it has tested the MicroFlex-F210A extensively, and the overclocking doesn't damage the system—and we didn't run into any problems during our testing. Nevertheless, it's a case of buyer beware. (As insurance, Micro Express offers new four-year warranties on parts and labor.) Overclocking might also prevent legacy PCI cards from running properly. If so, you can just change the jumpers and reset the PC so it's no longer overclocked—but, of course, you'll lose the speed boost.

In addition to extra speed and a low price, the F210A has some other notable features: An ATI 3D Pro Turbo PC2TV graphics card with 4MB of SGRAM—a Best Buy on our Top 10 Graphics Boards chart—pushes images to a clear 15-inch Princeton monitor. The system also comes with basics like a 33.6-kbps modem and a Toshiba CD-ROM drive that spins from 12X to 16X. There's nothing special about the look of the F210A on the outside, but the interior is very clean, with the cables tied off neatly. It's easy to access the two free DIMM sockets and the three free ISA slots.

Although we don't have enough information to evaluate the quality of its support, the company has some of the best support policies around. In addition to the new four-year warranties, Micro Express offers round-the-clock toll-free technical support. However, the limited number of readers who responded to our fax-back survey say the reliability of their Micro Express systems is only fair. ▶

Beyond the Top 20: Online

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- **Acer Aspire 1250**
- **DTK Quin-73M/PM166**
- **Everex Step Premier P233 MMX**
- **Premio Apollo TX 233**
- **Royal Synergy Pro 200 MMX**
- **Toshiba Equium 5230D-P233**
- **Vektron Vxi P-166 MMX**

See ATI at LVCC #1682

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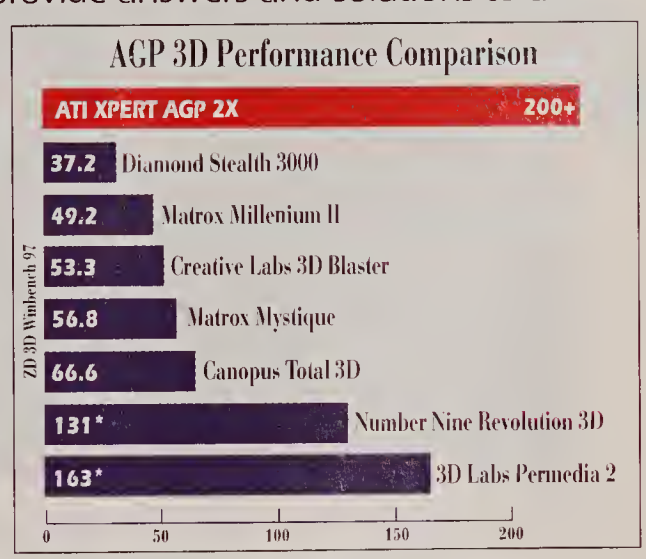

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3D Performance Comparison graph: Tested on Pentium II MMX-266MHz/ 32MB/512 cache/ Windows95-OSR2 Test Mode: 640x480x16bpp@75Hz - Tested using Driver Version: ATI XPERT AGP 2X 4.10B8H+/Diamond Stealth 3000 4.03.00.3205/Matrox Millenium II 4.03.3600/3D Blaster 4.02.020/Matrox Mystique 4.03.00.3410/Canopus 4.03.00.9001
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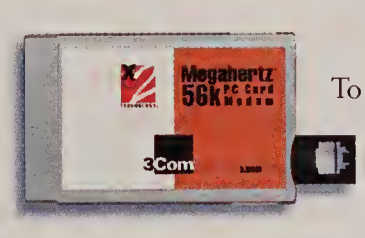

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Circle 238 on reader service card

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PC WORLD

TOP 10 NOTEBOOK PCs

	POWER NOTEBOOKS	Last month	Month tested	Street price (9/15/97)	CPU	Comments
1	Gateway 2000 Solo 2300XL 800/315-2536 www.gateway.com	–	NEW	$4049	Pentium MMX-233	Fastest notebook we've tested yet, excellent battery life, expensive.
2	Dell Latitude LM M166ST 800/388-8542 www.dell.com	3	June 97	$3349	Pentium MMX-166	$200 price drop on speedy notebook, near 6-hour battery life, no modem.
3	Gateway 2000 Solo 9100XL 800/315-2536 www.gateway.com	2	Nov 97	$4899	Pentium MMX-233	Fast PMMX-233 bumped from Best Buy by speedier 2300XL; big screen, pricey.
4	Micron Transport XKE 166 888/634-8799 www.micronpc.com	4	Sept 97	$5149	Pentium MMX-166	Very fast, fully loaded, 6-hour-plus battery life, fast CD-ROM drive; pricey.
5	Transmonde Vibrant 166Tmx 888/988-2882 www.transmonde.com	6	Sept 97	$3720	Pentium MMX-166	$179 price drop, sturdy notebook really flies; support polices are thin.
	BUDGET NOTEBOOKS					
1	Fujitsu LifeBook 435Dx 888/466-8434 www.fujitsu-pc.com	4	Oct 97	$1799	Pentium MMX-133	Reasonably priced, snappy PMMX-133; screen could be better.
2	AcerNote Light 383 800/733-2237 www.acer.com/aac	–	Sept 97	$1799	Pentium MMX-150	$500 price drop, good battery life; no modem.
3	CTX EzBook 764MT 800/888-9052 www.ctxintl.com	–	Sept 97	$2499	Pentium MMX-166	Affordable PMMX-166 is fast, but beware of skimpy support.
4	Toshiba Satellite 225CDS 800/334-3445 www.computers.toshiba.com	8	Nov 97	$1999	Pentium-133	Well designed, good keyboard; tech support free for only one year.
5	Gateway 2000 Solo 2300SE 800/846-2000 www.gateway.com	2	Nov 97	$2549	Pentium-133	Speedy for standard Pentium, longest battery life on Budget chart, modem.

Best Buy See features chart, page 326; test report, page 326.

[1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] Insufficient data to give a rating.

THE NEW GATEWAY 2000 Solo 2300XL is the second notebook we've tested with a Pentium MMX-233 processor, and it's the fastest portable we've seen. Because of its speed and very good features, it earns a number one Best Buy on our Power Notebooks chart. But speed isn't everything. The slowest notebook to claim a place on this month's charts is the Toshiba Satellite 225CDS, number four on the Budget Notebooks chart. This Pentium-133 machine is 33 percent slower than the speedy Solo 2300SE, but with a competitive price and good features, it still earns a slot on the chart.

POWER NOTEBOOKS

This Month's Best Buy

1 GATEWAY 2000 SOLO 2300XL

PRO: Fastest notebook to date, longest-lasting battery, good software bundle

CON: Expensive, below-average support quality

Gateway 2000's latest Pentium MMX-233 notebook has nearly all the qualities we like in a laptop: knockout speed, long battery life, and a great selection of software. The Solo 2300XL uses the same CPU as its 9100XL sibling, which earned second-place Best Buy last month, but the 2300XL is even faster and $850 cheaper. It delivered an exceptional PC WorldBench score of 244—the highest to appear in our notebook charts. Though the PMMX-233 chip runs fast, it also conserves power: The Solo 2300XL's lithium ion battery lasted for almost 9 hours in our tests. If you can afford to shell out the $4049 this Solo commands, you'll be the owner of one of the most impressive notebooks we've ever seen.

Gateway Solo 2300XL

The solidly built Solo 2300XL comes with a handsome collection of features, including a top-notch 3Com/U.S. Robotics 56-kbps PC Card modem, a 10X CD-ROM drive, a 2.1GB hard drive, and a large selection of software, ranging from business applications like Microsoft Office 97 to reference titles such as Bookshelf and Automap Streets Plus. The built-in speakers produce clear sound, unless you crank up the volume too high. Gateway also provides headphones, in case you want to listen to audio CDs or play CD-ROMs when your neighbors prefer quiet.

This notebook is also easy on the eyes and not too hard on the hands. Its 12.1-inch active-matrix screen runs at 800 by 600 resolution and produces bright, clear,

SCORECARD

★ Overall rating	PC WorldBench score/ performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/ rating	Traveling weight [1]	Reader service number
88	244/outstanding	average	average	outstanding	below average/fair	8:51/outstanding	average	679
85	212/very good	inexpensive	average	very good	average/fair	5:52/very good	average	680
84	242/outstanding	expensive	average	outstanding	below average/fair	4:43/good	heavy	681
84	221/very good	very expensive	above average	outstanding	[2]/fair	6:17/outstanding	heavy	682
83	218/very good	average	[2]	outstanding	[2]/poor	4:08/good	average	683
Power scorecard weightings ▶	**Performance 22 percent**	**Price 14 percent**	**Reliability 22 percent**	**Features 16 percent**	**Support 10 percent**	**Battery life 8 percent**	**Weight 8 percent**	
83	192/very good	very inexpensive	[2]	satisfactory	[2]/fair	3:42/good	average	684
82	191/very good	very inexpensive	below average	good	[2]/fair	6:11/outstanding	average	685
82	217/outstanding	expensive	[2]	very good	[2]/poor	4:40/good	average	686
81	165/good	inexpensive	average	good	below average/fair	3:19/good	average	687
80	196/very good	expensive	average	very good	below average/fair	7:32/outstanding	average	688
Budget scorecard weightings ▶	**Performance 14 percent**	**Price 22 percent**	**Reliability 22 percent**	**Features 16 percent**	**Support 10 percent**	**Battery life 8 percent**	**Weight 8 percent**	**All products: 907**

color-rich images. It has a good-size keyboard and a responsive touchpad. However, we found the keys too flat—they felt a little slippery when we typed.

Like all Gateway systems, this unit comes with a comprehensive manual. There's an index for quick reference and helpful, well-labeled photos. The company backs its notebooks with a one-year parts-and-labor warranty. If you need technical support, Gateway reps are available to answer your questions around the clock, but the quality of support isn't the best: Our readers rate it as below average. They rate the reliability of Gateway notebooks as average.

BUDGET NOTEBOOKS

This Month's Best Buy

1 FUJITSU LIFEBOOK 435DX

PRO: Very fast and solid, comfortable keyboard and mouse, 24-hour tech support

CON: Bulky, poor sound, dark dual-scan screen, no productivity programs

The Fujitsu LifeBook 435Dx, a no-frills corporate notebook, provides fast performance at a bargain $1799 price—a potent combination. The secret: Intel's low-priced PMMX-133, with the lowest clock speed yet of any mobile Pentium MMX chip.

Despite this lower clock speed, the LifeBook posted an impressive PC WorldBench score of 192—about as fast as the average PMMX-150 notebook. Perhaps even more important, the LifeBook gives you cost-effective access to the growing selection of MMX-enhanced software—this is a real plus if you don't want to pay a lot for a new notebook but want it to have a long and useful life.

Fujitsu LifeBook 435Dx

The LifeBook is not only quick, it's also enjoyable to operate. The Windows 95 keyboard is comfortable to type on, even if the keys click a little too loudly. We found the pointing device easy to use, too, and we especially liked being able to scroll through a document by sliding a finger up and down the touchpad's inside right edge. The LifeBook is well built: It has a sturdy design, with little flex in either the case or the screen panel.

High performance, a good price, good ergonomics, and a solid case make the LifeBook a Best Buy, but it still has room to improve. The 12.1-inch dual-scan display is a little dark, and colors lack vibrancy. Also, the stereo speakers sound a little tinny unless you keep the volume low.

At 8.4 pounds, the LifeBook weight is only average for a budget notebook, and the system can't run both the internal floppy drive and the internal CD-ROM drive simultaneously. (However, you can run the floppy drive externally while the CD-ROM drive occupies the internal bay.) Battery life is good at almost 3 hours and 45 minutes, while the 1.3GB hard drive is standard these days. You'll have to pay extra for applications—the LifeBook doesn't come with a software bundle. ▶

PHOTOGRAPHS: KEN SMITH

TOP 10 NOTEBOOK PCs — STANDARD FEATURES

	POWER NOTEBOOKS	CPU	Traveling weight (pounds)[1]	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	Gateway 2000 Solo 2300XL*	Pentium MMX-233	7.8	32	2.1	active	12.1	800 x 600	65,536	lithium ion	touchpad
2	Dell Latitude LM M166ST	Pentium MMX-166	7.8	40	2.2	active	12.1	800 x 600	65,536	lithium ion	touchpad
3	Gateway 2000 Solo 9100XL	Pentium MMX-233	9.2	32	3.1	active	13.3	1024 x 768	65,536	lithium ion	touchpad
4	Micron Transport XKE 166	Pentium MMX-166	9.2	32	3.1	active	13.3	1024 x 768	65,536	lithium ion	touchpad, eraserhead
5	Transmonde Vibrant 166Tmx	Pentium MMX-166	8.2	48	3.1	active	12.1	800 x 600	65,536	NiMH	touchpad
	BUDGET NOTEBOOKS										
1	Fujitsu LifeBook 435Dx*	Pentium MMX-133	8.4	16	1.3	dual-scan	12.1	800 x 600	256	NiMH	touchpad
2	AcerNote Light 383	Pentium MMX-150	7.2	24	2.2	dual-scan	11.3	800 x 600	65,536	NiMH	touchpad
3	CTX EzBook 764MT	Pentium MMX-166	7.8	40	1.4	active	12.1	800 x 600	16.8 million	NiMH	touchpad
4	Toshiba Satellite 225CDS	Pentium-133	7.8	16	1.3	dual-scan	12.1	800 x 600	16.8 million	lithium ion	eraserhead
5	Gateway 2000 Solo 2300SE	Pentium-133	7.8	32	2.1	dual-scan	12.1	800 x 600	65,536	lithium ion	touchpad

*Best Buy ● Yes ○ No [1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

Fujitsu generally does a good job of supporting its notebooks. The LifeBook's user guide is a little out of date (for example, it states that the CPU is a Pentium-120), but it's compact, easy to read, and well supported with diagrams. Numerous caution notes help novices steer clear of time-consuming errors.

The company's warranty for parts and labor lasts one year. Although the four-day guaranteed turnaround on repairs is longer than we like, toll-free technical phone support is available around the clock. We don't have enough fax-back survey results to report on Fujitsu's support or system reliability.

RUNNERS-UP

Beyond the Top 10

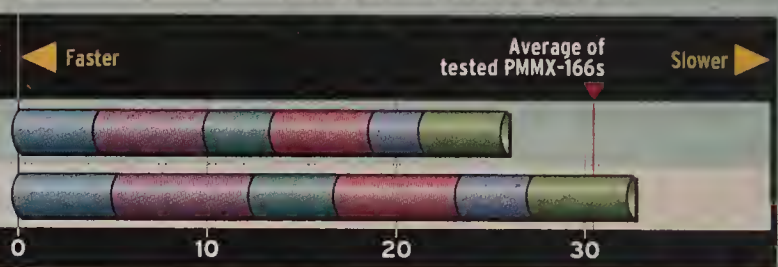
Twelve of the 13 notebooks we tested this month did not earn a position on our charts. Several, though, came close.

The **Panasonic CF-35**, for example, is fast and nicely designed but missed the charts mostly because of its relatively high price—$3860. It performed heroically in our battery-life tests, lasting for nearly 8 hours on one battery charge. Our unit was packaged with a 10X CD-ROM drive, a clear 12.1-inch active-matrix screen, and a good-size 2.1GB hard drive, yet it weighed only 5.5 pounds. Unfortunately, it did not include a modem—surprising given the price. Its PC WorldBench score of 194 is above average for a Pentium MMX-150.

The **Dell Latitude LM M133ST** is also a near-hit. It's a slower, less-expensive sibling of the Latitude LM M166ST, which takes spot number two on our Power Notebooks chart this month. These two systems share the same case design, the same comfortable keyboard, and the same sharp 12.1-inch active-matrix display, but the M133ST has less RAM (16MB versus 40MB) and a smaller hard drive (1.6GB versus 2.2GB). At $2599, the LM M133ST costs $750 less than its power-ranking rel-

BEST BUY NOTEBOOK PCs — TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Gateway 2000 Solo 2300XL	Pentium MMX-233	32	256	244
2	Fujitsu LifeBook 435Dx	Pentium MMX-133	16	256	192



Word 7.0 for Windows 95 · Excel 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · Paradox 5.0 for Windows · WordPerfect 6.1 for Windows · 1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

		EXPANDABILITY					CUSTOMER SUPPORT			
CD-ROM drive speed	Modem speed (kbps)	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
10X	56 [2]	192	1	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	–	72	1	●	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-20X	56 [2]	192	2	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-20X	33.6	128	2	●	○	●	3/1	24	Sat., Sun.	CIS, WWW
10X	33.6	64	0	●	●	●	1/1	11	–	WWW
10X	–	80	1	●	●	●	1/1	24	Sat., Sun.	WWW
10X	–	64	0	○	○	○	1/1	24	Sat., Sun.	BBS, WWW
8X	33.6	72	2	●	●	●	1/1	9	–	WWW
10X	–	144	1	●	●	●	1/1	24 [3]	Sat., Sun.	BBS, CIS, WWW
10X	56 [2]	192	1	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW

[3] First year.

ative, but it's still too expensive for a place on the Budget chart. On the other hand, it's very quick—its PC WorldBench score of 193 is the highest of any Pentium MMX-133 portable we've tested.

The **Sceptre Soundx S5500** is another noteworthy system that didn't make the chart this month. As one of only three Pentium MMX-233 notebooks that we've tested, it's part of a pretty elite company. However, unlike the other two PMMX-233 notebooks—Gateway's Solo 2300XL and Solo 9100XL—the Soundx S5500 doesn't have the support policies needed to earn a spot on the Top 10. Granted, this notebook does produce excellent performance: With a PC WorldBench score of 237, it's fast. However, even with 80MB of RAM, it's slower than the other Pentium MMX-233 notebooks. Its list of features includes such bragging material as a large 13.3-inch screen and a speedy 12X-20X CD-ROM drive.

A couple of other notebooks fell way off the charts but still deserve mention. One is the **IBM ThinkPad 765D/9546-49H**. Historically, ThinkPads don't often claim chart positions. They're typically sturdy and well designed, but they don't come cheap. The 765D is no exception: With a price tag of $5499, it's the most expensive notebook on our rolls.

The ThinkPad 765D surprised us on several counts, though. With a Pentium MMX-166 processor and a PC WorldBench score of 211, this system delivers plenty of processing power, but you won't get far on its battery. In our tests, the 765D wrung only about 2.5 hours from the lithium battery before we had to plug the computer in.

The 765D is also heavier than previous ThinkPads we've seen, most of which are designed to be the ultimate in portability: lightweight, slender systems without a great deal of built-in equipment. But the 765D's built-in CD-ROM drive pushes its weight up to 8 pounds. (As with most ThinkPads, you can attach the floppy drive externally.) While 8 pounds is an average weight for a notebook, a key attraction of most ThinkPads—and very probably the reason business travelers are willing to pay high prices for them—is their extra portability. The 765D, on the other hand, lacks this advantage and is like many another sturdy portable—except for its price.

Another notable notebook in our long list of runners-up is the **Toshiba Satellite Pro 440CDX**. Toshibas are generally good systems—this handsome gray model has a comfortable keyboard and a decent dual-scan screen. Like the ThinkPad, the 440CDX is designed so you won't have to continually keep swapping the CD-ROM drive and the floppy drive; instead, you can attach one drive externally. However, this system still doesn't have the star quality that's needed to claim a spot on our Budget Notebooks chart. With a Pentium MMX-133 processor, the 440CDX is the fastest Satellite Pro that we've tested, but it still manages to achieve only average speed for its processor class. In our tests, its 3-hour battery life was underwhelming, as was its minimum traveling weight of nearly 8 pounds. Most important, though, you just don't get enough machine for your money: We were disappointed that this $2499 Toshiba didn't come with a modem. ■

Beyond the Top 10: Online

We evaluated these systems along with the others, but like the other runners-up, they did not score high enough to reach the Top 10 Notebook PCs chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- **AcerNote Light 384**
- **Compaq Armada 1530DM**
- **NEC Versa 2760MT**
- **Samsung SensPro 525**
- **Sharp PC-9320T**
- **Transmonde Vibrant 133DMX**
- **WinBook XP5 Pro**

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Embedded RAID Upgrade option
I2O Ready via embedded Intel i960-RD
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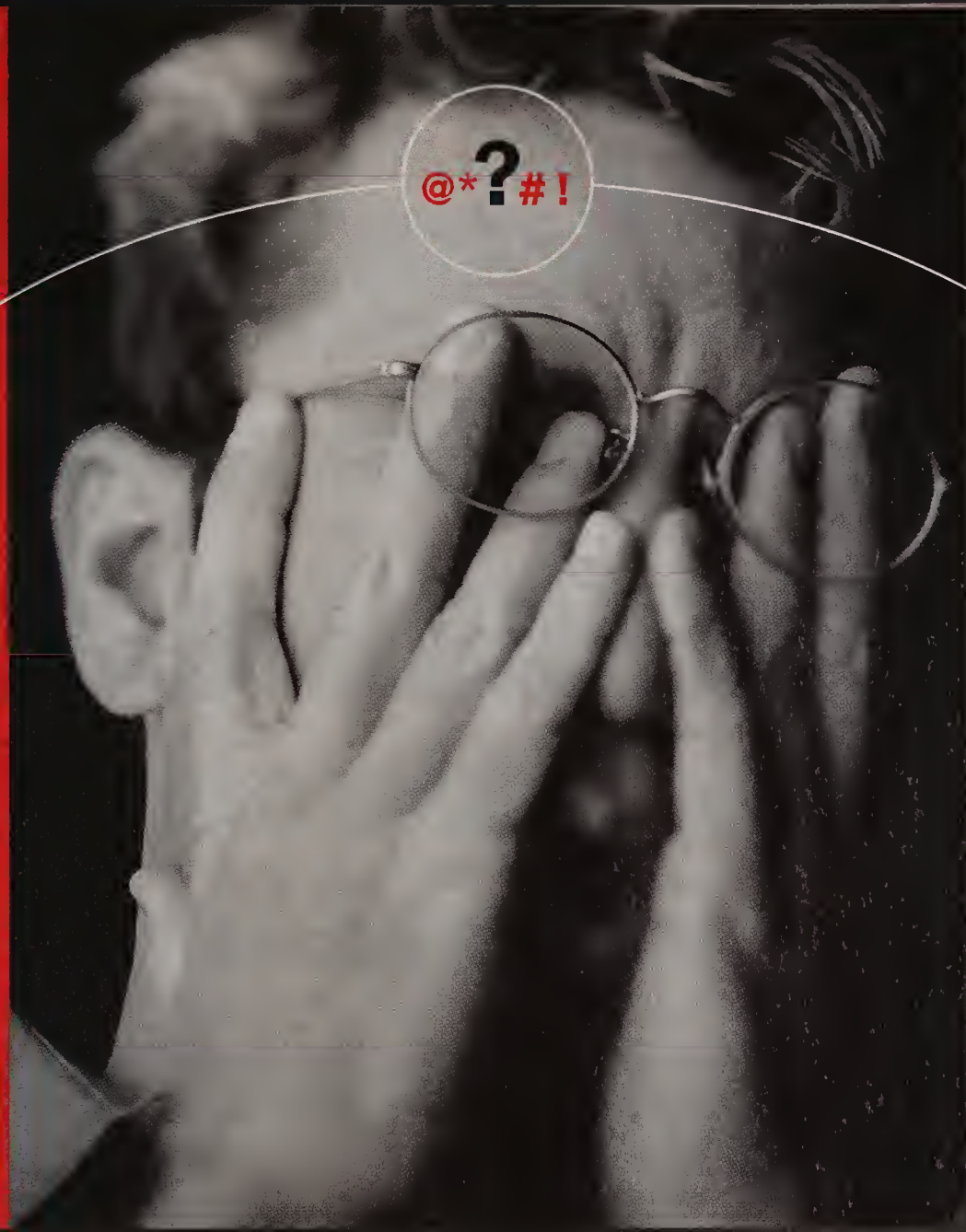

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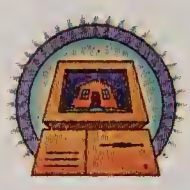
PC WORLD

TOP 10 HOME PCs

	POWER SYSTEMS	Last month	Month tested	Street price (9/15/97)	Comments
1	Dell Dimension XPS M233s 800/388-8542 www.dell.com	2[1]	Sept 97	$2299	**PRO:** Reasonably priced with recent $80 reduction, loaded with hardware, very fast; great choice as a powerful home office machine. **CON:** Very limited software bundle.
2	Micron Millennia Mme with Fusion 3D 888/634-8799 www.micron.com	4[1]	Oct 97	$2689	**PRO:** Very fast machine with a meaty configuration and a bunch of games; suitable for demanding home office tasks and family fun. **CON:** Rather on the pricey side.
3	HP Pavilion 8180 800/724-6631 www.hp.com/info/pchome1	–	NEW	$3298	**PRO:** Superfast, easy setup, very substantial hardware; great for home office duties and family entertainment. **CON:** Expensive (despite recent $400 price drop), so-so support rating.
4	HP Pavilion 8140 800/724-6631 www.hp.com/info/pchome1	–	NEW	$2098	**PRO:** Very reasonably priced (with recent $200 price drop), easy setup; suitable for basic home office applications. **CON:** Slowest machine in power section, so-so support rating.
5	HP Pavilion 8160 800/724-6631 www.hp.com/info/pchome1	–	Oct 97	$2598	**PRO:** Loaded with hardware features, easy setup; suitable for home office applications and family computing. **CON:** Second slowest machine on chart, a tad pricey, so-so support rating.
	BUDGET SYSTEMS				
1	Gateway 2000 G5-166 800/846-2000 www.gateway.com	1[1]	Nov 97	$1499	**PRO:** Very low price, with recent $100 price decrease; includes color printer; suitable for home office tasks and family fun. **CON:** Lacks power for high-end multimedia titles, so-so reliability rating.
2	Gateway 2000 G5-200M 800/846-2000 www.gateway.com	3[1]	Nov 97	$1948	**PRO:** Very fast machine with meaty hardware features for a good price. **CON:** Most expensive budget system, so-so reliability rating.
3	HP Pavilion 3100 800/724-6631 www.hp.com/info/pchome1	–	NEW	$1298	**PRO:** Very low price, supereasy setup, great for basic computing tasks. **CON:** Comes with small monitor; so-so support rating.
4	CyberMax PowerMax A16 233 800/437-4596 www.cybmax.com	–	NEW	$1749	**PRO:** Great price for fastest budget machine on the chart. **CON:** Company is not as well known as others; comes with older version of Corel WordPerfect Suite.
5	Monorail 7366e-PR166 888/880-7245 www.monorail.com	–	NEW	$1299	**PRO:** Tiny footprint, supereasy setup, good price. **CON:** Company is new to PC business, so we've no reliability or support data; no software bundle; not suitable for gamers; slowest PC on chart.

Best Buy

[1] Ranking on Top 5 Home PCs. [2] Insufficient data to give a rating.



WELCOME TO OUR BRAND-NEW Top 10 Home PCs. You asked for it, and you got it: In response to the growing popularity of the former Top 5 Home PCs among our readers, we're doubling coverage of home PCs. Starting this month, we'll test and rate the top 5 power systems and the top 5 budget systems. When it comes to home computers these days, one size definitely does not fit all.

That $3000 muscle machine with the huge hard disk, mountains of memory, and superfast CPU may be just the ticket for gaming fanatics or home office workaholics. But if you've got humbler needs, or if you're buying a second home computer, you could save some serious dollars by choosing a cheaper system. Read on.

In our new format, performance carries more weight for power systems (those costing more than $2000), and price is weighted more heavily for budget PCs. Both categories place most emphasis on reliability and support.

Dell Dimension XPS M233s

POWER SYSTEMS

THE TOP OF THE POWER chart this month belongs to Dell's Dimension XPS M233s. This blazingly fast Pentium MMX-233 packs a 4.2GB hard drive, a 17-inch monitor, and an Iomega Zip drive, all for a reasonable $2299. But you get only Microsoft Office 97 Small Business Edition and either Encarta 97 or Bookshelf 97. It's an excellent machine if you're looking for a powerful foundation for your home office.

If you're worried about obsolescence and you want to conserve cash up front, you may want to check out Dell's unique new 24-month consumer lease policy (800/753-9974).

In second place is Micron's Millennia Mme with Fusion 3D. It's very fast and comes with a Pentium MMX-233 CPU, a 17-inch monitor, and an Iomega Zip drive. It's slightly pricey at $2689 but is a suitable system for home office tasks and family entertainment.

In third spot is HP's powerhouse: the Pentium II-266–based Pavilion 8180. At $3298 it's not cheap, but it has super performance—its PC WorldBench score of 255 is the highest on this chart. The 8180 comes with a wireless mouse and HP's new multimedia keyboard. It's a great choice for home office duties, and it comes with a bunch of family software titles.

HP's $2098 Pavilion 8140 is much more affordable than the 8180, but it's nowhere near as fast or as feature laden. The fourth-place 8140 sports a Pentium MMX-200 processor, 32MB of RAM, a 15-inch monitor, and HP's multimedia keyboard. This machine will serve you well

SCORECARD

★ Overall rating	PC WorldBench score/rating	Price	Reliability/ support	Setup	Features	Reader service number
94	242/outstanding	inexpensive	best/best	fair	Pentium MMX-233, 32MB of SDRAM, 4.3GB hard drive, 8X-16X CD-ROM drive, 17-inch monitor, 33.6-kbps fax-modem, Iomega Zip drive.	611
88	241/outstanding	above average	good/best	good	Pentium MMX-233, 32MB of RAM, 3.1GB hard drive, 12X-24X CD-ROM drive, 17-inch monitor, 56-kbps fax-modem, Iomega Zip drive.	612
84	255/outstanding	expensive	good/fair	outstanding	Pentium II-266, 4BMB of SDRAM, 6GB hard drive, 12X-24X CD-ROM drive, 17-inch monitor, 56-kbps modem, wireless mouse, multimedia keyboard.	613
83	211/good	inexpensive	good/fair	outstanding	Pentium MMX-200, 32MB of RAM, 4.3GB hard drive, 12X-24X CD-ROM drive, 15-inch monitor, 56-kbps fax-modem, multimedia keyboard.	614
83	221/good	above average	good/fair	outstanding	Pentium MMX-233, 32MB of RAM, 6GB hard drive, 12X-24X CD-ROM drive, 17-inch monitor, 56-kbps fax-modem, multimedia keyboard.	615
Power scorecard weightings ▶	Performance 30 percent	Price 15 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	
94	218/very good	inexpensive	fair/best	outstanding	Pentium MMX-166, 16MB of SDRAM, 2GB hard drive, BX-16X CD-ROM drive, 15-inch monitor, 56-kbps modem, Canon BJC 250 color bubble jet printer.	616
90	239/outstanding	average	fair/best	outstanding	Pentium MMX-200, 32MB of RAM, 4GB hard drive, 12X-24X CD-ROM drive, 17-inch monitor, 56-kbps fax-modem.	617
87	172/good	very inexpensive	good/fair	outstanding	Pentium MMX-166, 16MB of SDRAM, 2GB hard drive, BX-16X CD-ROM drive, 14-inch monitor, 33.6-kbps fax-modem.	618
80	244/outstanding	average	2/2	good	AMD K6-233, 32MB of RAM, 6GB hard drive, 8X-16X CD-ROM drive, 17-inch monitor, 56-kbps fax-modem.	619
80	164/fair	very inexpensive	2/2	outstanding	AMD K5-PR166, 16MB of RAM, 2GB hard drive, 8X-16X CD-ROM drive, 10.4-inch flat panel display, 33.6-kbps fax-modem. No software.	620
Budget scorecard weightings ▶	Performance 15 percent	Price 30 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	All products: 902

for basic home office applications and entertainment.

Rounding out the top five power machines is yet another HP Pavilion—the 8160. Despite the 8160's meaty configuration, its PC WorldBench score of 221 is 20 points behind that of the next fastest PMMX-233 machine, Micron's second-place Millennia. At $2598, the 8160 is a little bit pricey, but it's a good option if you're looking for a system to handle home office and family computing needs.

Gateway 2000 G5-166

BUDGET HOME PCS

TOPPING THE BUDGET list this month is Gateway 2000's G5-166, which comes with Canon's BJC 250 color printer and a 15-inch monitor. The package is an all-around fabulous deal for $1499. The system's Pentium MMX-166 CPU and 16MB of SDRAM may lack the power for super-demanding action games, but it's a great machine for home office duties, surfing the Internet, and tons of family fun.

At number two is Gateway's Pentium MMX-200–based G5-200M. Faster and more expensive than its Best Buy cousin, the G5-200M comes with a larger 4GB hard drive, 32MB of RAM, and a 17-inch monitor. Its $1948 price is very good for such a speedy PC—the second fastest on our Budget chart. It's a great low-cost choice for home office and family computing.

In third place is the first real budget offering we've seen from HP. The small-frame Pavilion 3100 comes with a Pentium MMX-166 processor, 16MB of SDRAM, a 2GB hard drive, and an 8X–16X CD-ROM drive. It's very easy to set up, and the $1298 price includes a 14-inch monitor, but this is the second-slowest system on the Budget chart. The 3100 is ideal as a second family PC, as long as computing needs are on the light side.

In fourth place is CyberMax's PowerMax A16 233. It's the fastest PC on the Budget chart and loaded with features for just $1749. The K6-233–based PowerMax has 32MB of RAM, a 6GB hard drive, and a 17-inch monitor. Outfitted with Corel's WordPerfect Suite 7 and Compton's Encyclopedia, this system is a great choice for demanding home office duties if you don't want to shell out too much cash.

Monorail's Star Trek–like 7366e-PR166 all-in-one system is a snap to set up or move: Simply unpack, hook up the keyboard and mouse, and you're ready to roll. The CPU is mounted behind a notebook-style 10.4-inch flat panel display. The system costs a low $1299, but it doesn't come with any software, and it's very slow. With an AMD K5-PR166 processor (it's equivalent to a P-166), the 7366e crawled through our PC WorldBench tests, posting a score of 164. But if you're tight on space and need a computer for simple tasks, this could be the one for you.

—*Kirk Steers*

Kirk Steers is a contributing editor for PC World. *Testing performed by Ulrike Diehlmann of the PC World Test Center.* ■

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PC WORLD

TOP 10 PRINTERS

	MONOCHROME PERSONAL PRINTERS	Month tested	Street price (9/1/97)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	Reader service number
1	Minolta PageWorks 6L 888/264-6658 www.minoltaprinters.com	NEW	$299	81	5.2	3.2	**FEATURES:** 6-ppm laser. Standard 256K of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **PRO:** Good text quality; easy to use; sturdy construction despite small size; good CD-ROM bundle; low price. **CON:** Gray scale is a little fuzzy; amount of RAM is fairly small.	723
2	NEC SuperScript 860 800/632-4636 www.nec.com	retested this month	$399	81	7	3.4	**FEATURES:** 8-ppm laser. Standard 1MB of RAM, 600-by-600-dpi maximum resolution, 200 sheets input, 50 output. **PRO:** Blistering text speed, easy controls for creating booklets and more, two-year warranty. **CON:** Gray-scale graphics are blotchy, pages collate in reverse order.	724
3	HP LaserJet 6Lse 800/752-0900 www.hp.com	retested this month	$399	79	5.1	2	**FEATURES:** 6-ppm laser. Standard 1MB of RAM, 600-by-600-dpi maximum resolution, 100 sheets input, 100 output. **PRO:** Strong print quality and paper handling, convenient design, excellent manual. **CON:** Still the slowest on the monochrome chart, software bundle not very useful.	725
4	NEC SuperScript 660plus 800/632-4636 www.nec.com	retested this month	$299	78	5.2	3.3	**FEATURES:** 6-ppm laser. Standard 256K of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **PRO:** Includes CD-ROM full of fonts, clip art, and more; prints exit facedown so they're stacked correctly, unlike with 860 model; quiet. **CON:** Inadequate documentation, wrinkles envelopes.	726
5	Panasonic KX-P6500 800/742-8086 www.panasonic.com	retested this month	$349	78	5.7	3.6	**FEATURES:** 6-ppm laser. Standard 512K of RAM, 2400-by-600-dpi maximum resolution, 100 sheets input, 50 output. **PRO:** Excellent text quality, especially with 2400-dpi resolution enhancement; tower design saves space. **CON:** Gray scale looks posterized; on-screen help lacks detail; awkward power switch.	727
	COLOR PERSONAL PRINTERS							
1	Canon BJC-4300 800/848-4123 www.ccsi.canon.com	retested this month	$199	85	2	0.3	**FEATURES:** 5-ppm monochrome/2-ppm color ink jet. 720-by-360-dpi maximum resolution, 100 sheets input and output. **PRO:** Low price, prints fine on plain paper, very good results on ink jet stock, great manual and software, easy to install and use. **CON:** Text is a bit fuzzy, slowest printer on color chart.	728
2	Epson Stylus Color 800 800/463-7766 www.epson.com	retested this month	$399	80	3.8	1.1	**FEATURES:** 8-ppm monochrome/7-ppm color ink jet. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. **PRO:** $50 price drop since June, two-year warranty, network and PostScript options, very fast at 360 dpi, vivid color. **CON:** Gray scale is harsh, 1440-dpi printing is much slower than at 360 dpi.	–
3	Canon BJC-7000 800/848-4123 www.ccsi.canon.com	retested this month	$449	80	2.3	0.3	**FEATURES:** 5-ppm monochrome/3.5-ppm color ink jet. 1200-by-600-dpi maximum resolution, 130 sheets input and output. **PRO:** Good print quality overall, impressive colors on coated paper, nice CD-ROM of extras and an excellent manual. **CON:** Drivers are confusing; noisy; very expensive.	729
4	HP DeskJet 722C 800/752-0900 www.hp.com	NEW	$349	78	4.1	0.3	**FEATURES:** 5-ppm monochrome/1.5-ppm color ink jet. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. **PRO:** Very easy to use, quiet, great text quality on plain paper, very fast. **CON:** Prints from photos could be better, documentation somewhat disorganized.	730
5	HP DeskJet 694C 800/752-0900 www.hp.com	retested this month	$299	77	2.2	0.3	**FEATURES:** 3-ppm monochrome/0.8-ppm color ink jet. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. **PRO:** Easy to use, prints well on plain paper, software includes home and small office applications. **CON:** Grainy colors, printing photos requires special ink and paper.	731

Best Buy For expanded reviews, visit www.pcworld.com/t10printers. Windows 95-certified Plug and Play All products: 908

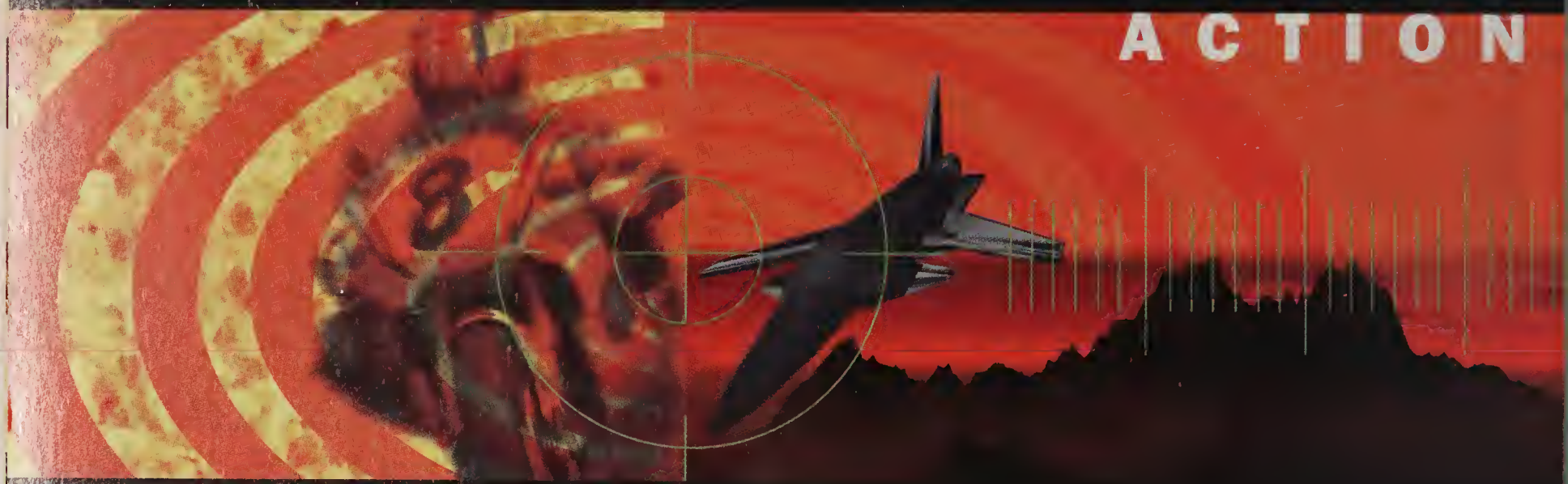
HOW WE TEST The overall rating for both monochrome and color personal printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

MINOLTA'S PAGEWORKS 6L is our new monochrome Best Buy this month. An inexpensive laser, it does a nice job overall with text and graphics. HP's new DeskJet 722C lands in fourth place on the color chart. It's a good small-office printer that's fast and quiet and produces sharp text and graphics. We tested these printers and others in this month's personal printer roundup—see "Text, Graphics, and...Photos?" for details. ■

POWER

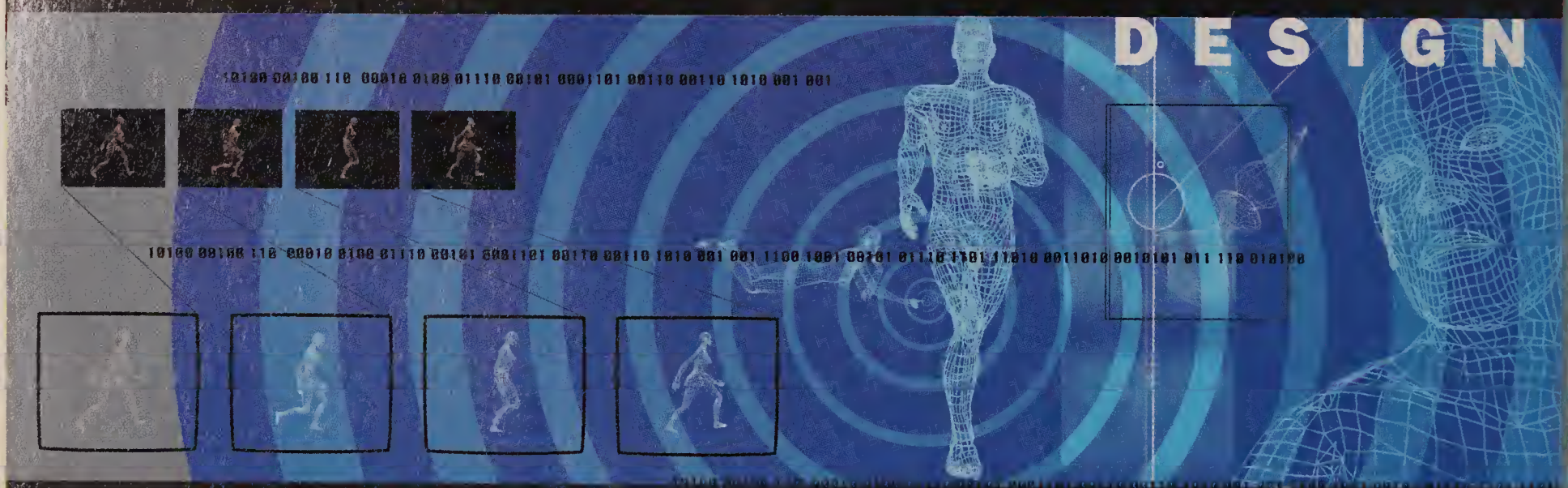
• 128-bit 2D/3D multimedia accelerator • 4MB of 100MHz SGRAM memory • 230MHz integrated RAMDAC

ACTION



• 1.6 Gigabyte/sec data transfer rate • Video out for connection to TV's • Vertex and texture caching

DESIGN



• 5 GFLOP setup & rendering engine • 100 Million rendered pixel/sec fill rate • 15 Billion pixel operations/sec

VELOCITY 128™ MULTIMEDIA ACCELERATOR

• Lifetime Warranty

3D WinBench '97 Performance†

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Copyright 1997 STB Systems, Inc. All rights reserved. All trade names referenced are the trademarks, service marks, or registered trademarks of their respective holders. †30 WinBench 97 1.0 tests conducted on a Gateway 2000 PII-266 MMX, PCI 2.0 Bus, 512K cache, 64MB SDRAM, 640x480x16bit, at 75Hz refresh without GDI bypass as required for Microsoft certification. Memory and driver versions: STB VELOCITY 128™ (4 MB) (AGP version) 4.10.01.0116 9/23/97, Diamond Monster 3Dfx (4MB) 4.03.00.2108 4/16/97, Matrox Millennium II (4MB) 4.03.00.3600 5/12/97, Matrox Mystique 220 Business (4MB) 4.03.00.3600 5/12/97. Specifications subject to change without notice.

Circle 200 on reader service card

PC WORLD

TOP 10 MONITORS

	15-INCH MONITORS	Month tested	Street price (9/15/97)	Overall rating	Quality of text/graphics	Comments	Reader service number
1	Panasonic PanaSync Pro P15 800/742-8086 www.panasonic.com	Oct 97	$349	83	very good/ excellent	**FEATURES:** 14-inch viewable area, .27mm dot pitch tube, up to 75-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free tech support. **PRO:** Crisp text and best color graphics with unusually clear detail, large viewable area, easy-to-adjust on-screen controls. **CON:** No tilt control, generic appearance.	601
2	Mitsubishi Diamond Scan 15VX 800/843-2515 www.mitsubishi-display.com	Oct 97	$350	83	very good/ very good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] image correction utility, three-year warranty, 8.5-hour weekday toll-free support. **PRO:** Terrific text and highly detailed graphics, very high refresh rate, ample plain-English menus. **CON:** No tilt control.	602
3	Goldstar StudioWorks 57i 800/243-0000 www.lgeus.com	NEW	$300	82	very good/ very good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **PRO:** Fine image quality, very high refresh rate, good price, well designed, easy-to-adjust controls. **CON:** Boxy appearance.	603
4	Samsung SyncMaster 500b 800/933-4110 www.sosimple.com	retested this month	$300	82	very good/ very good	**FEATURES:** 13.6-inch viewable area, .28mm dot pitch tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **PRO:** $79 price drop, fine picture quality, very high refresh rate, sleek contemporary design, easy to adjust. **CON:** Fairly crude on-screen menu icons.	604
5	MAG InnoVision DJ530 800/827-3998 www.maginnovision.com	NEW	$288	82	very good/ very good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 12-hour weekday toll-free support. **PRO:** Sharp text and graphics, great price, terrifically easy to adjust. **CON:** Power switch is awkwardly placed.	605
6	Hitachi SuperScan Pro 500 800/441-4832 www.nsa-hitachi.com	Oct 97	$299	82	good/ very good	**FEATURES:** 13.6-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **PRO:** $50 price cut, realistic graphics. **CON:** Short support hours, fairly small viewable area, text in our newsletter not as dark and sharp as on some monitors.	606
7	MaxTech XT-5862 800/936-7629 www.maxcorp.com	NEW	$249	82	very good/ very good	**FEATURES:** 13.9-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **PRO:** Lowest price, sharp picture, very high refresh rate. **CON:** Fairly clumsy controls with no on-screen display and no degauss button, short support hours.	607
8	Dell UltraScan 800HS 800/289-3355 www.dell.com	Oct 97	$399	81	very good/ very good	**FEATURES:** 13.7-inch viewable area, .25mm stripe pitch Trinitron tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] 24-hour toll-free support. **PRO:** Fine image quality, easily adjustable, drop-down door prevents accidental changes. **CON:** Brief one-year warranty, very faint line across screen, expensive.	608
9	ViewSonic G653 800/888-8583 www.viewsonic.com	NEW	$309	81	good/ very good	**FEATURES:** 13.9-inch viewable area, .28mm dot pitch tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 11-hour weekday toll-free support. **PRO:** Vivid colors, easily adjustable, attractive price. **CON:** Small fonts a bit fuzzy in our newsletter.	609
10	Gateway 2000 CrystalScan 500 800/846-2000 www.gateway.com	Oct 97	$305	80	very good/ good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 75-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **PRO:** Crisp text, good price, liberal assortment of controls, door prevents accidental changes. **CON:** Hard to tell what control buttons do in different modes.	610

Best Buy For expanded reviews, visit www.pcworld.com/t10monitors. All products: 901

[1] Highest refresh rate at 1280 by 1024 resolution. [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), features and ease of use (25 percent), price (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

15-INCH MONITORS are getting cheaper and better. Half this month's models cost $300 or less, and seven rate very good or better on both text and graphics. Five units make the chart for the first time, led by the Goldstar, Samsung, and MAG models in third through fifth place. The number seven MaxTech has clumsy controls—but costs only $249 and has a sharp image. Hurt by its high price, Dell's UltraScan 800HS dropped from third to eighth. ■

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FEATURING MMX™ TECHNOLOGY

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- 32X Max[^] Variable CD-ROM Drive
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers
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- Iomega Zip 100MB Internal Drive

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- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB nVidia 4MB AGP Video Card
- 32X Max[^] Variable CD-ROM Drive
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- Altec Lansing ACS-90 Speakers

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Order Code #591103

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FEATURING MMX TECHNOLOGY

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- ★ *Upgrade to 64MB SDRAM Memory, add $159.*
- ★ *Upgrade to a 6.4GB Ultra ATA Hard Drive (9.5 ms), add $59.*

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Business Lease[◊]: $73/Mo., 36 Mos.
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NEW DELL DIMENSION XPS D300
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- *NEW* Matrox Millennium II 8MB WRAM AGP Video Card[=]
- *NEW* 32X Max[^] Variable CD-ROM Drive
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- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive

$3399

Personal Lease: $151/Mo., 24 Mos.[◊Ø]
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266MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 64MB SDRAM Memory
- *NEW* 6.4GB Ultra ATA Hard Drive (9.5ms)
- *NEW* 1000TX Trinitron Monitor (15.9" v.i.s., .26dp, 1280x1024 max. res.)
- *NEW* Matrox Millennium II 8MB WRAM AGP Video Card[=]
- 32X Max[^] Variable CD-ROM Drive
- *NEW* Sound Blaster AWE64 Value Sound Card
- Altec Lansing ACS-290 Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive

$2899

Personal Lease: $129/Mo., 24 Mos.[◊Σ]
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NEW DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 64MB SDRAM Memory
- *NEW* 6.4GB Ultra ATA Hard Drive (9.5ms)
- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB nVidia 4MB AGP Video Card
- 32X Max[^] Variable CD-ROM Drive
- *NEW* Sound Blaster AWE64 Value Sound Card
- Altec Lansing ACS-90 Speakers
- ★ *Upgrade to 128MB SDRAM with ECC, add $339.*

$2399

Personal Lease: $107/Mo., 24 Mos.[◊∞]
Order Code #501102

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Windows® 95 ◆ Microsoft Internet Explorer

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- 800HS Monitor (13.7" v.i.s., .26 dp)
- 2MB EDO ViRGE 3D Video
- 24X Max§ Variable CD-ROM Drive
- 3Com 3C905 Fast EtherLink XL 10/100 PCI Card
- Iomega Zip 100MB Internal Drive with One Cartridge

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- Outlook 97
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- Encarta 97
- Greetings Workshop
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Microsoft Internet Explorer 4.0

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Common features: ◆ 512KB Integrated L2 ECC Cache ◆ Integrated PCI Ultra-Wide SCSI-3 Controller ◆ Intel Pro/100B PCI Ethernet Adapter ◆ Intel LANDesk® Server Manager v2.5x ◆ **3 Years Next-Business-Day On-site△ Service**

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- 24X Max§ Variable SCSI CD-ROM
- Microsoft Windows NT® Server 4.0 (10 Client Access Licenses)
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- 6 Expansion Slots: 3 PCI, 3 EISA

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- 64MB ECC EDO Memory (512MB Max)
- 4GB Ultra-Wide SCSI-3 Hard Drive (7200 RPM, 8ms) (27GB Max)
- 24X Max§ Variable SCSI CD-ROM
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NEW DELL INSPIRON 3000 M233XT
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Common features listed above plus:
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- 32MB SDRAM (144MB Max)
- 512KB L2 Pipeline Burst Cache
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- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- Zoom Video and USB Ports
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- Cardbus Ready/Fast IR1.1
- 6.9 Pounds*

★ *Upgrade to 64MB SDRAM, add $399.*

$3899‡

Business Lease: $138/Mo., 36 Mos.
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NEW DELL INSPIRON 3000 M200ST
200MHz PENTIUM PROCESSOR w/MMX

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- 12.1" SVGA Active Matrix TFT Display
- 32MB SDRAM (144MB Max)
- 512KB L2 Pipeline Burst Cache
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus Ready/Fast IR1.1
- 6.4 Pounds*

★ *Upgrade to a 4GB Hard Drive, add $349.*

$3199‡

Business Lease: $113/Mo., 36 Mos.
Order Code #891102

NEW DELL INSPIRON 3000 M166ST
166MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 16MB SDRAM (144MB Max)
- 256KB L2 Pipeline Burst Cache
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- Zoom Video and USB Ports
- Stereo Speakers with 3D Surround Sound and Yamaha SW Wavetable
- Cardbus Ready/Fast IR1.1
- 6.4 Pounds*

★ *2nd Lithium Ion Battery, add $169.*

$2799‡

Business Lease: $102/Mo., 36 Mos.
Order Code #891103

DELL LATITUDE® LM M133ST
133MHz PENTIUM PROCESSOR w/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix TFT Display
- 16MB EDO RAM (72MB Max)
- 256KB L2 Pipeline Burst Cache
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 800x600
- Integrated 16-bit Stereo Sound
- IrDA 1.0 Std. Compliant
- Under 7 Pounds*

★ *Upgrade to 40MB RAM, add $299.*

★ *LM Port Replicator, add $129.*

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Business Lease: $91/Mo., 36 Mos.
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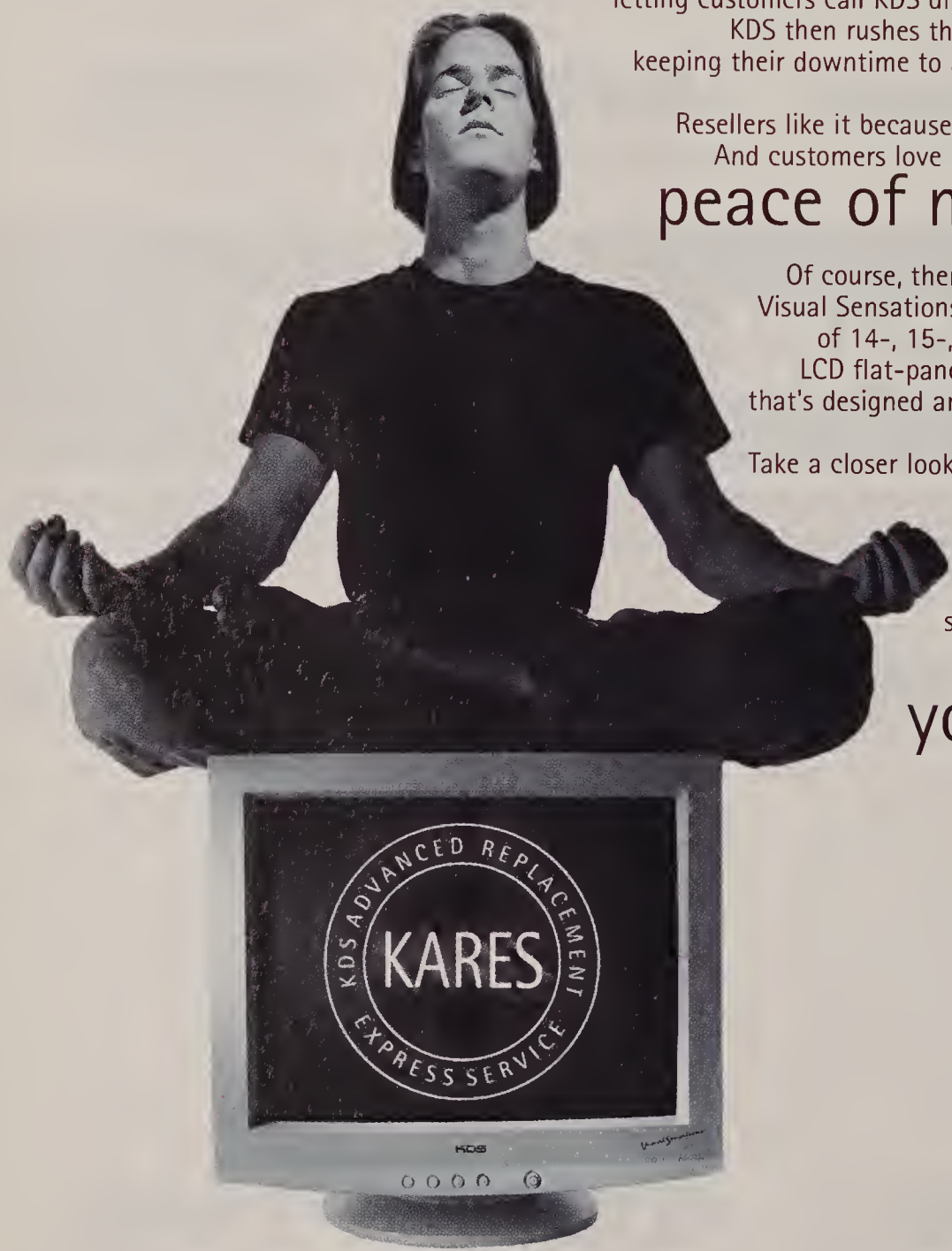

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Circle 170 on reader service card

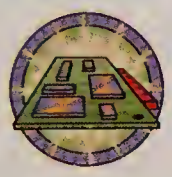
PC WORLD

TOP 10 GRAPHICS BOARDS

	GRAPHICS BOARDS	Month tested	Street price (9/25/97)	Overall rating	PC WorldBench graphics score/ rating	3D rating	Multimedia rating	Comments	Reader service number
1	ATI 3D Pro Turbo PC2TV 905/882-2600 www.atitech.com	Oct 97	$219	98	189/ very good	good	outstanding	**FEATURES:** 8MB of SGRAM; 200-MHz RAMDAC; ATI Rage II chip; bundled 3D modeling, image editing, and VRML software. **PRO:** Terrific multimedia performance, nice 3D, connects to TV. **CON:** Expensive, mediocre video playback, no toll-free support.	629
2	ATI Xpert@Work 905/882-2600 www.atitech.com	NEW	$169	97	191/ outstanding	good	good	**FEATURES:** 4MB of SGRAM (upgradable to 8MB), 230-MHz RAMDAC, ATI Rage Pro chip, bundled photo editing and 3D modeling software. **PRO:** Fast all around, great utilities, connects to a TV, good price. **CON:** So-so 3D images, no toll-free support.	630
3	STB Nitro 3D 800/234-4334 www.stb.com	retested this month	$99	97	190/ outstanding	adequate	adequate	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/GX chip, bundled 3D games. **PRO:** $50 price drop, fast 2D, excellent AVI playback, toll-free support, lifetime warranty. **CON:** Even with new drivers, below-average 3D game play.	631
4	Diamond Stealth 3D 3000 800/468-5846 www.diamondmm.com	Oct 97	$170	96	191/ outstanding	adequate	very good	**FEATURES:** 4MB of VRAM, 220-MHz RAMDAC, S3 Virge/VX chip, bundled 3D game plus 3D design software and multimedia encyclopedia. **PRO:** Fast 2D, great 3D in two game tests. **CON:** A bug messed up Independence Day game, no toll-free support.	632
5	ATI 3D Xpression+ PC2TV 905/882-2600 www.atitech.com	Oct 97	$115	95	190/ outstanding	adequate	adequate	**FEATURES:** 4MB of SGRAM; 170-MHz RAMDAC; ATI Rage II chip, bundled 3D games plus 3D modeling, image editing, and VRML software. **PRO:** Slight price drop, a bargain, connects to a TV. **CON:** Mediocre video playback, no toll-free support.	633
6	Diamond Stealth 3D 2000 Pro 800/468-5846 www.diamondmm.com	Oct 97	$135	94	191/ outstanding	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D game plus photo editing software and multimedia encyclopedia. **PRO:** Great 2D, inexpensive, connects to TV. **CON:** Bug in Independence Day game, no toll-free support.	634
7	STB Velocity 3D 800/234-4334 www.stb.com	retested this month	$199	93	189/ very good	poor	adequate	**FEATURES:** 4MB of EDO VRAM (upgradable to 8MB), 220-MHz RAMDAC, S3 Virge/VX chip, bundled games. **PRO:** Better 2D and AVI video playback in retest, toll-free support, lifetime warranty. **CON:** Poor for 3D games even with new drivers.	635
8	STB Velocity 128 800/234-4334 www.stb.com	Nov 97	$199	93	189/ very good	very good	adequate	**FEATURES:** 4MB of SGRAM, 230-MHz RAMDAC, nVidia Riva 128 chip, bundled games and 3D image editing software. **PRO:** Excellent 3D quality and 2D performance, good software bundle for gamers. **CON:** Poor AVI video playback.	636
9	Hercules Terminator 3D/DX 800/532-0600 www.hercules.com	Oct 97	$149	92	189/ very good	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D games. **PRO:** Good price, quick in multimedia programs, excellent AVI video playback, toll-free support. **CON:** Subpar 3D quality overall, driver bug in Terracide game.	637
10	Matrox Mystique 220 800/361-1408 www.matrox.com/mga	Oct 97	$139	91	191/ outstanding	adequate	good	**FEATURES:** 4MB of SGRAM (upgradable to 8MB), 220-MHz RAMDAC, Matrox MGA-1164SG chip, bundled 3D games and VRML software. **PRO:** $40 off, fast, easy to install and use. **CON:** Direct3D games look bad, no toll-free or weekend support.	638

Best Buy For expanded reviews, visit www.pcworld.com/t10graphics. All products: 904

HOW WE TEST We tested PCI boards under Windows 95 with PC WorldBench 1.0 at 800 by 600 and 16.8 million colors, 1024 by 768 and 65,536 colors (reported here), and 1280 by 1024 and 65,536 colors. The 3D rating is based on frame rates in our VRML and 3D game tests and on subjective ratings in three games. The multimedia rating is based on frame rates in our Macromedia Director and AVI playback tests and on timed scores in our PowerPoint multimedia presentation tests. Boards were tested in a Dell Dimension XPS P133c with 32MB of EDO DRAM and 256K of pipeline-burst secondary cache. The overall rating is based on performance (40 percent), features (30 percent), price (20 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



OF THE FOUR NEW BOARDS we tested this month, only the ATI Xpert@Work claims a position on our chart. In 3D tests, the Xpert@Work is only a shade behind the number eight STB Velocity 128, which has the chart's quickest 3D performance. And in 2D speed the ATI card equals Diamond's Stealth 3D 3000 and 3D 2000 Pro cards. The Xpert@Work's biggest drawback? Although 3D games play smoothly, images don't look great. ■

What 22 years in the monitor business gets you.

Premium Aperture Grille Monitor *technology. At a shadow mask monitor price.*

0.25mm Dot Pitch *for a brighter, clearer, tighter image.*

Full ***16.0" viewing area*** *shows more of what's on your screen*

Sharp, crisp, flicker- free ***77Hz resolution at 1280 x 1024***

Three-Year Warranty *for CRT parts & labor, of course.*

One-touch On-Screen Display *with digital controls.*

Used to be, there were two ways to get the sharper picture, richer colors and enhanced clarity of Aperture Grille technology. You could buy a high-end professional monitor from a company like NEC, Sony or Mitsubishi, with all the high-end features and a price to match. Or you could spend a lot less. And end up with a stripped-down imitation. Fortunately, that was then.

Now, of course, there's TeleVideo, the company that's been pioneering high-end technology for ordinary folks and quietly selling high-performance monitors at very reasonable prices since 1975. We've got a complete line of large-screen Aperture Grille monitors, including the flagship SVP260 pictured above. All with features comparable to (or even superior to) the Big Names, but at prices you can live with.

So how do we do it? Call **1-800-835-3228** to find out. Or visit us at **www.televideoinc.com**. But for now, let's just say that when you've been in the monitor business since bell-bottoms were cool, you learn a few things.

TeleVideo: good monitors, reasonable prices. (See for yourself.)

	Model	Aperture Grille (mm)	Refresh Rate (Hz) @1600x1200	H-Scan (KHZ)	MSRP ($)
17"*	**TeleVideo SVP260**	**0.25**	**66**	**24-82**	**779**
	Mitsubishi 87TXM	0.25	66	30-86	829
	Sony 17sell	0.25	60	30-85	899
	ViewSonic PT770	0.25	66	24-82	799
17"*	**TeleVideo SVP270**	**0.25**	**75**	**30-95**	**889**
	Eizo-Nano TX-C7S	0.25	73	30-92	1125
	Nokia 447Xi	0.25	n/a	31-92	899
	Sony 17sell	0.25	60	30-85	899
21"*	**TeleVideo SVP350**	**0.28**	**85**	**30-107**	**1649**
	Mitsubishi 91TXM	0.28	75	30-95	1649
	NEC P1150	0.28	75	31-94	1599
	IIYAMA Pro 21	0.30	75	30-94	1699

***Diagonal viewable area may vary.**

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Circle 222 on reader service card

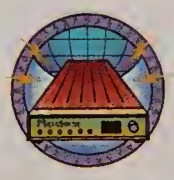
PC WORLD

TOP 10 MODEMS

	33.6-KBPS EXTERNAL MODEMS	Month tested	Street price (9/19/97)	Overall rating	Average transfer time per MB (min:sec)	Comments	Reader service number
1	Diamond Multimedia SupraSonic 336V+ 800/727-8772 www.diamondmm.com	Aug 97	$170	81	2:44	**FEATURES:** Flash ROM, distinctive ring, 115.2-kbps PC-to-modem speed, serial cable, headphones, microphone, COMit voice/fax/data software, Caller ID, voice enabled. **PRO:** Loaded with features, technical support available on Saturdays, $29 price drop. SupraFax voiceless sibling also a good buy. **CON:** A bit pricey.	736
2	3Com/U.S. Robotics Courier V.Everything 33.6 800/877-2677 www.3com.com	Jan 97	$225	80	2:42	**FEATURES:** Flash ROM, distinctive ring, 230.4-kbps PC-to-modem speed, manual volume control, QuickLink II fax/data software, password protection, callback security. **PRO:** Rich in features, great documentation, fast PC-to-modem rate. **CON:** Most expensive modem on chart, takes up a lot of desk space.	737
3	Zoom FaxModem V.34X Plus 800/631-3116 www.zoomtel.com	Aug 97	$99	79	2:52	**FEATURES:** MNP-10EC error control, distinctive ring, 115.2-kbps PC-to-modem speed, serial cable, DOS/WinFax Lite fax/data software. **PRO:** Least expensive modem on chart after fifth-place NewCom, easy-to-follow documentation, seven-year warranty. **CON:** Lackluster performer, no security features such as Caller ID.	738
4	Logicode Quicktel II-E With LED Array 800/735-6442 www.logicode.com	Oct 97	$110	79	2:52	**FEATURES:** Novel curved design, voice mail, 115.2-kbps PC-to-modem speed, speakerphone, DSVD, microphone, QuickLink II Message Center and Intel ProShare software, Caller ID. **PRO:** Inexpensive, full-featured, good documentation, $20 price drop. **CON:** A bit sluggish, supplied book about the Internet outdated.	739
5	NewCom 33600efx 800/563-9266 www.newcominc.com	Mar 97	$85	79	2:48	**FEATURES:** V.FC, MNP-10 error control, 115.2-kbps PC-to-modem speed, serial cable, QuickLink II fax/data software. **PRO:** Lowest-price modem on the chart, toll-free technical support available on weekends. **CON:** Has only the basic features, documentation could use improvement.	740
	56-KBPS EXTERNAL MODEMS						
1	Global Village Communication TelePort 56/x2 Fax/Modem 800/736-4821 www.globalvillage.com	NEW	$119	80	2:59/2:56 [1]	**FEATURES:** x2 protocol, 115.2-kbps PC-to-modem speed, serial cable, Global Transfer Light data software, FaxWorks fax software. **PRO:** One of two least expensive 56-kbps modems on chart, installation is a breeze, excellent documentation. **CON:** Very sluggish 33.6-kbps performance, limited technical support hours.	741
2	3Com/U.S. Robotics Sportster 56K Faxmodem External 800/342-5877 www.3com.com	Oct 97	$219	79	2:44/2:56 [1]	**FEATURES:** x2 protocol, distinctive ring, 115.2-kbps PC-to-modem speed, manual volume control, RapidComm fax/data software. **PRO:** Terrific documentation, unconditional free upgrade to 56K standard even if modem swap is required, great software. **CON:** Only 56-kbps unit over $200, no cross-ship replacement.	742
3	Zoom FaxModem 56Kx 800/631-3116 www.zoomtel.com	Nov 97	$139	79	2:31/3:08 [1]	**FEATURES:** K56flex protocol, MNP-10EC error control, 230.4-kbps PC-to-modem speed, distinctive ring, COMit data software, WinFax Lite fax software. **PRO:** Fastest on our 33.6-kbps tests, long tech support hours including Saturday, $30 price cut. **CON:** Few extras, no security features such as Caller ID.	743
4	Diamond Multimedia SupraExpress 56e Sp 800/727-8772 www.diamondmm.com	NEW	$150	78	2:36/3:05 [1]	**FEATURES:** K56flex protocol, distinctive ring, 230.4-kbps PC-to-modem speed, V.80, audio and serial cable, voice mail, microphone, speakerphone, COMit and FaxTalk Messenger data/fax software, Caller ID. **PRO:** Feature-packed, good price, good software. **CON:** Serial cable not detachable, subpar documentation.	744
5	Motorola ISG ModemSurfr 56K Desktop Data/Fax Modem 800/566-3266 www.mot.com/modems	Oct 97	$119	76	2:34/3:08 [1]	**FEATURES:** K56flex protocol, distinctive ring, 230.4-kbps PC-to-modem speed, V.80, Trio Communications Suite fax/data software, Caller ID. **PRO:** Free upgrade to 56K standard, quick PC-to-modem rate, $60 price cut. **CON:** Documentation mostly on disc, skimpy support hours, no cross-ship replacement.	745

Best Buy For expanded reviews, visit www.pcworld.com/t10modems. [1]V.34 TAS transfers/56-kbps ISP downloads; see "How We Test." All products: 909

HOW WE TEST We test 33.6-kbps modem-to-modem performance using a pair of identical modems on a Telecomm Analysis Systems simulated phone network. It sends a text file over 55 line conditions, and a mix of five files—graphics, text, program, and compressed files—over one line condition. For our 56-kbps tests, we call a local Internet service provider access number and transfer .jpg, .doc, and .zip files continuously over an 18-hour period. The times to transfer a megabyte of data are higher in the ISP test than in the TAS test because the files used in the former are less compressible. Results for the two tests are not comparable. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



A GLOBAL VILLAGE modem grabs our number one 56-kbps slot this month for its low price, swift 56-kbps download rate, and bang-up documentation. At $119, it's one of the cheapest 56-kbps units we've tested. For a more expanded feature set, check out Diamond's SupraExpress 56e Sp. It's the only 56-kbps unit on our chart with voice mail and speakerphone capabilities, making it a good candidate for small- and home-office users. ■

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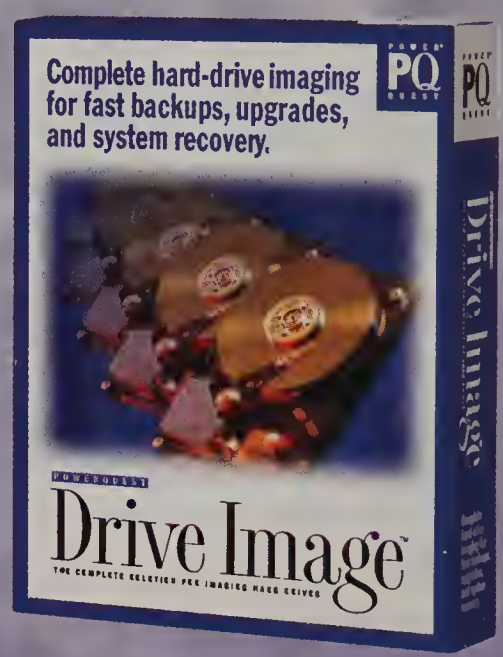
When you need an instant copy of your hard drive, Drive Image is the picture-perfect solution. You can easily create and store a compressed image file of your entire hard drive, or just selected partitions, on a JAZ,® Zip,™ network, or second hard drive. That makes backups a breeze, and even a dreaded hard-drive crash is no problem. To restore your system, simply download your drive's image file from its storage source and you're ready to go. Drive Image also makes upgrading to a larger hard drive a snap. Simply copy everything from your old drive to your new drive. You can even specify the size of the partitions on the new drive during copying so everything fits the first time. And Drive Image is fast. Its patent-pending SmartSector™ technology works up to two to three times faster than straight file-by-file or sector-by-sector methods of copying. That saves you time and a lot of aggravation. For more information about Drive Image, visit our Web site at **www.powerquest.com.** To clone multiple workstations, contact PowerQuest for information on additional licensing options. Call **1-800-379-2566** for details.



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FROM THE MAKERS OF PARTITIONMAGIC®

POWER PQ QUEST

Circle 193 on reader service card

From Snapshots to Web Sites

OKAY, YOU'RE ON the cutting edge. You own a color scanner, a digital camera, or a video camera and capture board. Or maybe you're not that hip, but at least you've developed pictures to a photo CD, right? The point is, the photos are digital. And your hard drive has become the world's most expensive (and bulky) photo album. Now what do you do? How can you disseminate those digital photos among family and friends without wasting a lot of time or looking like the dork you're afraid you're becoming?

First, put aside your fears of turning into a computer geek. It's too late. Just use that powerful technology on your desk to make quick work of updating family on events in your life, sending sentimental cards, or just distributing photos of the new house (baby, dog, car, whatever). With the right tools, these social niceties won't even cut into your weekend barbecuing (or Web surfing).

EDITED BY
Angela Freeman

ILLUSTRATION: JEFF BERLIN

CARD SHARK

THE SIMPLEST WAY to put those photos to work is to turn them into fetching greeting cards. Several software packages do this with a minimum of effort on your part, and all of them are out in brand-new versions—Broderbund's The Print Shop Signature Greetings (reviewed in the November column), **Microsoft's Greetings Workshop Deluxe,** and **Micrografx's American Greetings CreataCard Gold.** I prefer CreataCard, despite its sappy art, because it has tons of cards and projects and is simple to use. Just pick one of 4500 cards, insert a photo, tweak the sentiment and graphics, and you've got yourself one nice photo greeting card. Like most of these products, CreataCard will also build labels, gift tags, envelopes, stationery, even business cards using either your photos or its own art.

And no more guilt about forgetting your nephew's birthday or your parents' anniversary—CreataCard's calendar program will pop up and remind you. Or, if you want to devote an entire Sunday to creating cards for the rest of the year, CreataCard will remind you when it's time to send them.

Broderbund's Signature Greetings has much more elegant art than the other two packages. It is not as flexible when it comes to customizing your creations so that they reflect your personality, but if all you want is a point-and-click card program, go with Signature Greetings.

Okay, you've designed the perfect holiday card, and you could just print it out and mail it. There is an easier way, however, if you are ready to embrace that computer dork within. Just push a button and e-mail it to everyone on your list. Or—even better—post it to the Web. ▶

SHOW OFF ON THE WEB

IF YOU'VE CREATED only one holiday card, e-mail is a perfect way to send it. But what about those other familial obligations? The incessant: "When do we get a new photo of the kids?" Or "How big is the puppy?" Or "I can't wait to see the new house." Admit it, you've already thought about building a Web page, e-mailing your URL to everyone you know, and then just sitting back and letting the family marvel at your creativity and technical acumen. If you're like me, the only thing stopping you is time. Well, listen up: Some new tools can get your baby photos on the Internet faster than you can get off the telephone when that long-winded cousin of yours calls.

CREATIVE SPACE: Find inspiration for customized photo albums, cards, and more in the Photo Creations Studio.

PictraAlbum from Pictra and **Photo Creations All-in-One Studio** from Creative Wonders let you compile photos into albums and publish them on the Web without any troublesome technical or design machinations. Say you just want to send some snapshots without a lot of cute extras. PictraAlbum is a bare-bones application with a single purpose: organizing your photos into albums. It assumes your pictures are ready to go; just pick one of 14 background styles, drag and drop the digital photo into your album, enter captions, and hit the *Publish* button. Your vacation album is uploaded to PictraNet. Now you can answer all those eager questions with one URL (www.pictranet.com). You can even password-protect the site if you're worried about those photos of the dog ending up on some bestiality site. You can add new albums or update old ones whenever you want, as long as you don't exceed your allotted storage space limit. 10MB (about 30 photos) costs $49.95 for a year; 30MB bumps it up to $99.95.

If you want something fancier, check out Photo Creations. It'll make cards, banners, and other stuff, but its focus is photo albums. It has ready-made templates for wedding albums, baby books, and the like (complete with themed graphics), but you can also build an album from scratch. Drag your photos into place, type in captions, paste in graphics and clip art, even add sounds (you can record your own or use the ones provided). Piece of cake. Then you can either e-mail your album (a player is automatically attached) or upload it to the Creative Wonders Web site. Unlike with PictraNet, though, displaying your online album here doesn't cost you anything, and there's no limit to how many pictures you can upload.

GO ALL THE WAY

BUT IF YOU really want to impress the gang with your computer savvy (that's right, *be proud of* your inner dork), build your own Web page. **Windows Draw 6** from Micrografx has a Web Publishing Wizard that makes it hugely easy to create a site that looks like you hired a professional (it also has an extensive array of image editing and drawing tools). Say you've got a snapshot of you, the family, and the new dog together on your summer camping trip. Start with that, type in a caption for the photo, add a forest background and some outdoorsy clip art, and create buttons that link to other family members' pages. Draw will save the whole business in HTML, letting you review all the links in the process so you know that everything works. All you have to do is upload the creation to your Internet service provider. When some important event happens, just update the Web site, complete with photos. Think of it—you can e-mail your in-laws the URL and never have to mail a photo again.

Of course, your in-laws might ask for reprints of those lovely photos they've ▶

F Y I

1997 WAS THE second year in a row that Internet users reported they read fewer magazines and newspapers and watched less television because of the Internet.

SOURCE: FIND/SVP SURVEY OF INTERNET USERS

SCORECARD

American Greetings CreataCard Gold
Grade: **A**; Price: $49.95 list; Micrografx; 800/733-3729; www.micrografx.com
READER SERVICE NO. 746

Greetings Workshop Deluxe
Grade: **B**; Price: $49.95 street; Microsoft; 800/426-9400; www.microsoft.com
READER SERVICE NO. 747

Kodak Picture Network
Grade: **A-**; Price: scanning about $5 per roll; storage $4.95 per month for 100 images; Kodak; www.kodakpicturenetwork.com
READER SERVICE NO. 748

Photo Creations All-in-One Studio
Grade: **A**; Price: $49.99 list; Creative Wonders; 800/543-9778; www.photocreations.com
READER SERVICE NO. 749

PhotoNet
Grade: **B+**; Price: scanning about $4 per roll, storage free for 30 days, then $4.95 per month; PictureVision; www.photonet.com
READER SERVICE NO. 750

PictraAlbum, PictraNet
Grade: **B+**; Price: $49.95 per year for 10MB, $99.95 per year for 30MB; Pictra; 800/874-2872; www.pictranet.com
READER SERVICE NO. 751

The Print Shop Signature Greetings
Grade: **B+**; Price: $29.95 list; Broderbund; 800/657-2709; www.broderbund.com
READER SERVICE NO. 752

Windows Draw 6
Grade: **A**; Price: $49.95 list; Micrografx; 800/733-3729; www.micrografx.com
READER SERVICE NO. 753

Xerox Document HomeCentre
Grade: **B-**; Price: $499 list; Xerox Corp.; 800/832-6979; www.xerox.com
READER SERVICE NO. 754

ILLUSTRATION: ROBERT KOPECKY

"I COULDN'T BELIEVE MY EYES!"

If it weren't for Family Tree Maker,™ I would never have found my family

Using Family Tree Maker, Diana found her great-great grandparents Hannah & William Hunt Wilson.

Dear Family Tree Maker,

I became interested in genealogy because I never knew my ethnic heritage. The only ancestor name and location I knew of was that of my great-great grandfather, William Hunt Wilson who lived in Oregon.

I then decided to purchase a genealogy program, and chose Family Tree Maker because of the FamilyFinder™ Index. I went home, loaded the program, did a search in the FamilyFinder Index using my great-great grandfather's name, and it referenced a World Family Tree™ CD.* I couldn't believe my eyes!

I found the name "William Hunt Wilson" on the CD. The family tree was huge — hundreds of names! My name was not there, so I decided to contact the tree's contributor to let her know that I found the connection. I left a message, and that night, I received the long-awaited call. The contributor, who is also my cousin, was screaming on the phone because she could not believe she had found me. I was part of a "long lost leg" that the family had not heard of for over 50 years! We laughed, we cried, and talked all night. And now, we have contact every day — either by phone or by e-mail.

A family reunion is scheduled to take place this Fall, thanks to Family Tree Maker. I never would have found my family if it weren't for the program.

Thank you!

Diana Yashar

San Jose, CA

PRESERVE MEMORIES EASILY

- Organize facts, photos & stories
- Print beautiful family trees, books & reports
- Make family web pages, multimedia scrapbooks & more

FIND ANCESTORS QUICKLY

- 9 CDs of data (included) help you find your ancestors fast
- Go online to find more with exclusive Internet search tools

Awards won by Family Tree Maker™ Deluxe Edition II, the previous version.

Circle 36 on reader service card

Brøderbund®

*The World Family Tree CDs contain actual family trees. Submitter information is available free upon request. Family Tree Maker is available now for Windows 3.1, Windows 95, and Power Macintosh. Features vary according to platform and price. Additional accessory CDs sold separately. ©1997 Broderbund Software, Inc. All products are trademarks of their respective holders.

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seen on your Web page. But the Web can even help you there: Kodak recently launched its **Picture Network**, and **PhotoNet** from PictureVision has been around for a while. When you drop off a roll of film, simply check a box on the order envelope asking that your photos be uploaded to the Web. Within a week your newest photos are on the Web, in addition to being developed and printed. You can e-mail your in-laws a photo postcard from the Web, or simply send out the URL, and your family can see the latest picture of the baby and even order the reprints themselves.

VIRTUOSO: Xerox HomeCentre prints, scans, and copies in color.

Although PhotoNet's basic service (30-day storage) is free and enables you to print photos on things like mouse pads, mugs, and calendars, Kodak Picture Network has some significant features that make it more useful. You can upload your own photographs to your personal site (although you can't get reprints). It's also available through more than 30,000 developers who already use Kodak. PhotoNet, on the other hand, is available only through participating stores (such as Wolf Camera and The Camera Shop).

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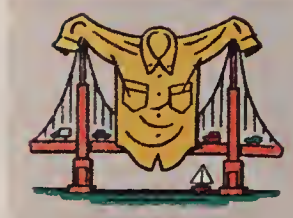

MEN ARE BUYING button-front shirts in record numbers from the Lands' End Web site. According to the company, during the first six months of 1997, the site sold enough button-down shirts to span San Francisco's Golden Gate Bridge six times.

YESTERDAY'S TECHNOLOGY STILL WORKS

A TIME MAY come when even you will want to resort to the arcane tactic of actually printing your cards or photo albums. Of course, almost any new ink jet printer turns out crisp color photos, especially if you use glossy paper. But recently there's been a spate of those devices that claim to do everything from scan to fax to copy to print to wash windows. Xerox has just such a device: The **Document HomeCentre**. It combines a detachable color scanner, a color ink jet printer, and a color copier.

Whoever invented that detachable scanner is right up there with Einstein, as far as I'm concerned. It's great to be able to capture images from bound books and magazines—no need to rip out pages any longer. It captures both photos and text beautifully.

The $499 HomeCentre also does an impressive, if slow, job of printing and copying in color, cranking out one vibrant color page per minute (black and white is four times as fast). Unfortunately, it doesn't do quite as well with printing photos. Even after adjusting all the controls—color intensity, contrast, and so forth—the photos that scanned in so nicely came out fuzzy and discolored. Now, you may be a computer dork, but I'll bet you still have some pride. So you probably don't want to mail distorted copies of your photos. If you really want to print your own photos, I'd recommend investing in a top-quality ink jet printer. (See our roundup of color and monochrome units, "Text, Graphics...and Photos?" in this issue).

Here's a warning: Your computer can save you the hours you once spent getting photos developed and mailed. But think twice before you tell everyone how easy it was to build your Web page. You could spend twice as much time handling the deluge of technical calls you'll get from everyone in your family trying to do the same thing. But, hey, at least you'll all have something to talk about at those holiday get-togethers. —*Angela Freeman*

Angela Freeman is a staff editor for PC World. ■

KEEPING UP

The Right Tool for Travel

EVERYONE KNOWS THAT MapQuest (www.mapquest.com) is a great way to get directions to wherever you want to go. Now the service is even better with TravelPlan USA, sort of like a concierge on your desk. It offers information about hotels and restaurants, weather reports, and even local events for some 2000 cities worldwide, and it gives you the capability to create personalized itineraries. Are you planning to relocate? Check out MapQuest's MoveQuest service: It will help you find a place to rent or buy, give you an idea of what it will all cost, and help you track down the local furniture store, the cable company, and stuff like that.

Last-Minute Gifts?

YOU PROBABLY KNOW people who have finished all their holiday shopping by June. You and I will be surfing the Net at the last minute because all the stores are closed. With us in mind, Virtual Vineyards (www.virtualvin.com) has opened a new gift shop. As usual, you can search for fine wines (or bargains) and get advice from the site's wine snobs. But now, you can also order gift baskets of wine or even chocolate, coffee, cookies, or other goodies in fancy baskets. These aren't your usual mystery baskets full of food you've never heard of. These downright classy packages feature California gourmet restaurant fare, from $8 caramels to $355 Baku beluga caviar, and just about everything in between.

The Internet Diet

TRYING TO LOSE a few pounds before the holiday scarfing season begins? Remember, knowledge is power. And do you really *know* what impact that pastry you're contemplating will have on your waist? Get the facts. Check out Cyberdiet (www.cyberdiet.com). It'll tell you the truth about calories, fat, sodium, and lots more for 16,000-plus foods. It'll even give you a customized personal nutritional profile based on your height, build, age, and activity level. —Christina Wood

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Windows Improved, With No Help From Microsoft

MY MOTHER ALWAYS gave me good advice: Check your spelling, wear clean underwear, and don't pick on anyone bigger than you. Ummm, Mom? I think I'm in trouble. In the last few columns, I've pummeled Microsoft. So far I've survived, but I'm peering through my curtains now at what looks like an unmarked car with two big guys holding very big laptops.

Microsoft has loads of people beta testing the company's products, and plenty of usability labs. But I don't think they're paying attention to the people in the trenches—you know, the *real* end users. Us.

The evidence? Too many Microsoft products come up a dollar short and a day late. Windows 95's Dial-Up Networking is a perfect example. DUN is the applet used to create a connectoid (yes, that's what it's called) that lets you hook up to an Internet service provider. DUN is light-years ahead of Win 3.*x*'s Trumpet-WinSock rigmarole, but it's still difficult to configure with its convoluted TCP/IP twists and Server Gateway turns.

Dial-Up Networking doesn't have to be so perplexing. The rescue—as is so often the case—comes from a third party. EarthLink, an ISP, took the bull by the horns and enhanced DUN. I played with a beta version of its TotalAccess 2.0, and I like it. The dialer is a treat, letting me choose from up to ten phone numbers, and the Internet Network Wizard is handy for diagnosing problems.

Microsoft left other touches out of DUN—simple things you'll treat as prized possessions once you have them. Let me introduce you to Dial-Up Networking Connection Enhancement, a freebie program known as DUNCE. When I'm ready to log on to the Internet, I click on the Connect To Shortcut on my desktop, and

Too many Microsoft products come up a dollar short and a day late.

DUNCE redials my Internet service provider when I'm disconnected or get a busy signal. Folks, that's cool.

LET'S HEAD FOR THE OFFICE

I WON'T MINCE words: I think Microsoft Word 97 is the best product in town. Navigating docs with the Document Map is terrific, and I love the grammar checker that catches my *you're/your* and *it's/its* errors. But once you get a taste of Office Toys or WOPR, you'll see what Word is missing.

First, Office Toys: Writing this column, I have nine WinWord docs open. Office Toys lets me save them as a "project" called, say, HomeOffice (pretty original, no?). Next time I go to HomeOffice, all the files are open and ready. This feature alone is worth the price of admission.

I dread the thought of losing files to a crash. So when I close a file, Office Toys automatically backs it up to another folder, to a floppy, or as a Zip file. There are dozens more cool things in Office Toys—and it's shareware, so try away.

WOPR 97 (yeah, it does sound like a hamburger) is a winner I've used for years. I recently explored a beta of the new version. WOPR's Two by Four is a delicious multipage-printing feature that lets me print documents in half a dozen ways, including double-sided, thumbnail, and as a flier or booklet. The program's Enveloper is by far the most sophisticated I've used. There's also a way to remove those pesky extra line breaks when I import ASCII text files.

Deciding which of these two programs to use is like choosing between a Volvo and a Saab—each is solid and reliable and comes with things I like. But Office Toys gets my hard drive space: Its Project Manager and AutoPilot features won me over. Download both and decide for yourself.

By the way, if you think I'm the only one trouncing Redmond's Attila the Hun, you're wrong. Zillions of Bill jokes are floating around the Internet. Read through my favorites at www.pcworld.com/dec97/jokes.

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online *Find files from this article at www.pcworld.com/files. Contributing Editor Steve Bass is a licensed marriage and family therapist and the president of the Pasadena IBM Users Group. See page 14 for contact information.* ■

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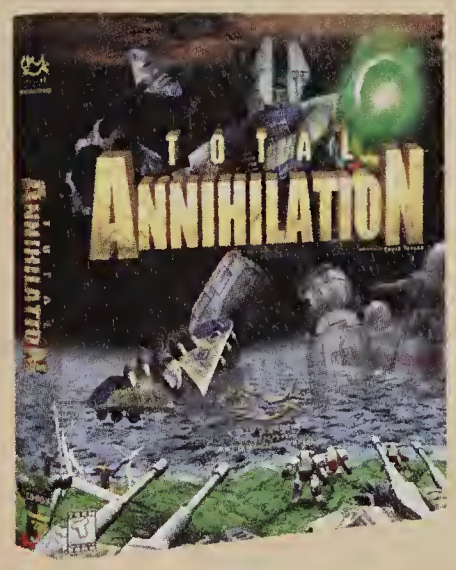

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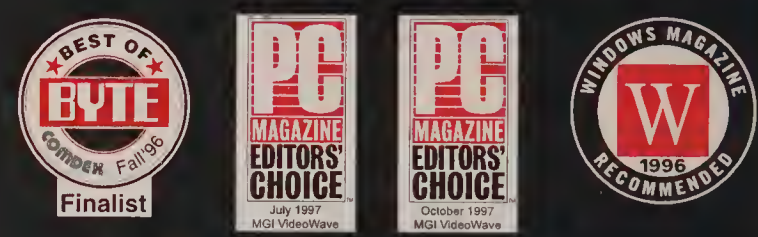

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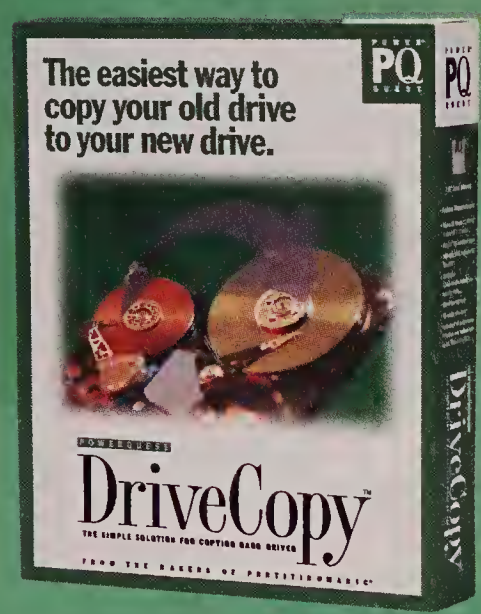

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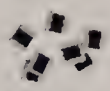

Use Sequence Capture with the PhotoVista software to create full 360° panoramic images

AVI Capture combined with VDOPhone software gives you full Internet conferencing capability

File Manager shows thumbnails of pictures you've captured

from here...

with PhotoVista

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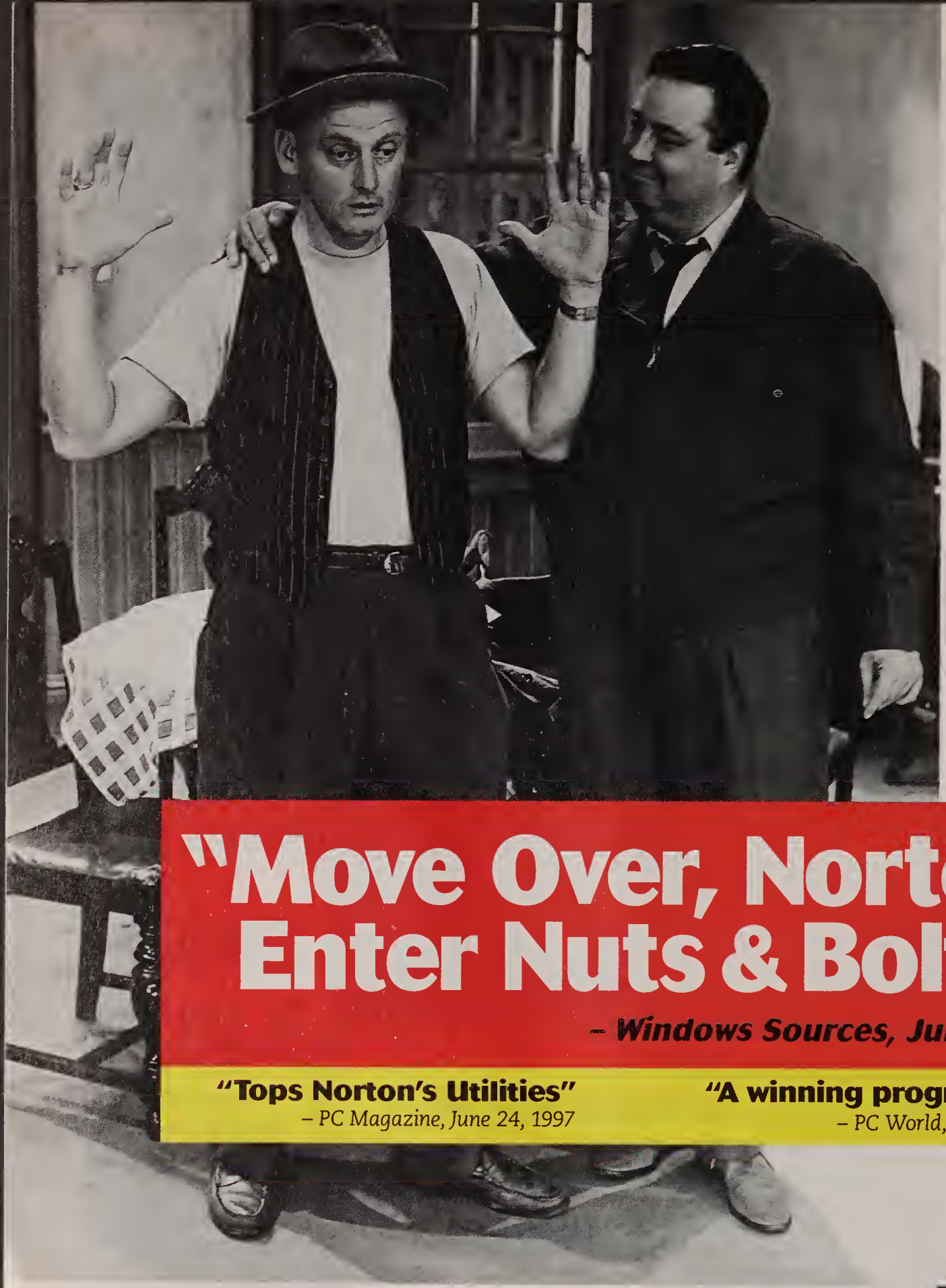

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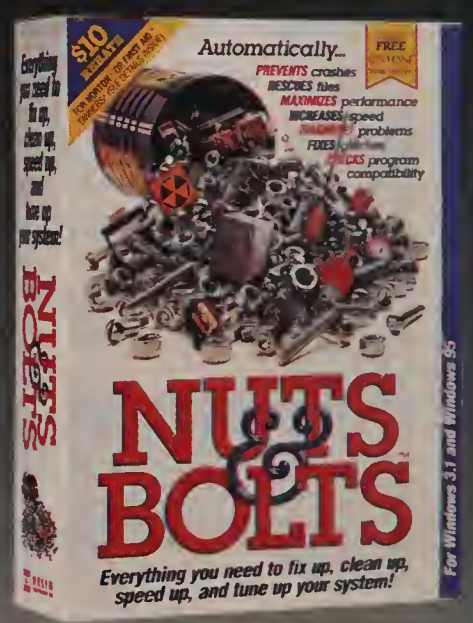

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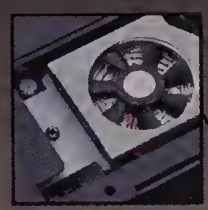

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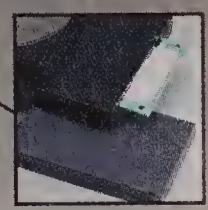

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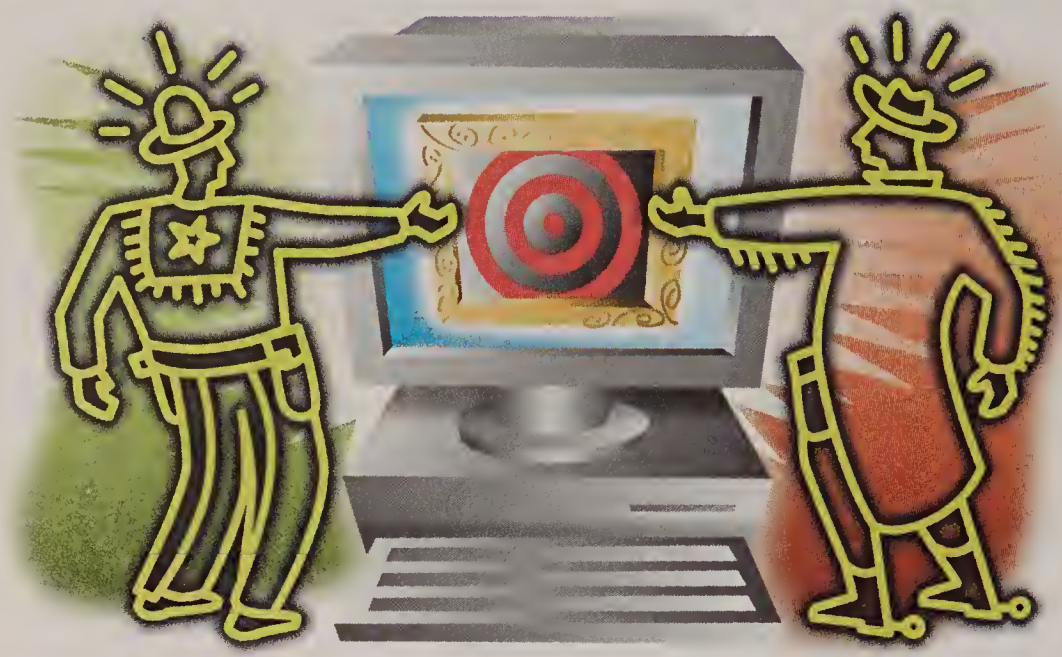
HERE'S HOW



A N S W E R L I N E

Tell Your Files to Get With the Program

EVERY TIME I double-click a .gif or .jpg file on my HP Pavilion 7330z, it launches a program called Imgservr, part of the PowerAlbum application that came with the system. I would prefer to open the files in Microsoft Internet Explorer. How can I make IE the default browser for these file types?

Ruth Brus, Sarasota, Florida

WITH WINDOWS 95 it's easy to change the program associated with a particular file type—if you know where to look. But no reasonable person would ever think to look where Microsoft hid this function.

To change a file type's association, open a standard folder window or Windows Explorer, and locate a file of the type you wish to change—.gif or .jpg in your case. Right-click the file and select *Properties*. In the resulting dialog box, make a note of the Type and click *OK*.

Now here's the tricky part. Select *View•Options* and click the *File Types* tab. You'll see an alphabetical list of 'Registered file types' currently on your system. Double-click the file type you noted earlier; the Edit File Type dialog box will appear. In the Actions list, double-click *open*.

You guessed it: Another dialog box appears (see **FIGURE 1**). In the 'Application used to perform action' field, enter the path and file name (enclosed in quotes) of the application you want the files to open in—for instance, **"C:\Program Files\Internet Explorer\IExplore.exe"**. If you can't remember the full path and file name of the program, click the *Browse* button to make your way there. Click *OK* to return to the Edit File Type dialog box.

You can now either click *Close* a couple of times to apply your changes, or do another trick while you're here. Do you sometimes want to launch .gif and .jpg files in Imgservr, and other times in Internet Explorer? You can associate a file type with more than one application.

In the Edit File Type dialog box, click the *New* button. You'll get a small dialog box for adding another action to the file type. In the Action field, type an easily recognizable name of the new application—for instance, **Internet Explorer**. In the 'Application used to perform action' field, enter the program's path and file name. Click *OK* or *Close* until you return to the desktop. Now when you double-click a file of this type it will open in the original application, but when you right-click it the context menu will list both ways to launch the file, identifying the new one by what you typed in the Action field.

THE INTERNET MAIL SHORTCUT

IF I WANT TO read my e-mail in Internet Mail, I have to first launch Internet Explorer, then select Read Mail from the Mail button. Is there any way to cut out the middleman and just open Internet Mail directly?

Michael McCouch
Turnersville, New Jersey

WHEN YOU FIRST installed Internet Explorer 3.*x*, the installation program should have created a Shortcut to Internet Mail. Look through your Start menu for an item called Internet Mail. (If you've upgraded to IE 4.0, look for Outlook Express.)

If the Shortcut isn't there, create one. To create a Shortcut directly on the desktop, simply right-click the desktop and select *New•Shortcut*. To add a Shortcut to a specific folder, right-click the *Start* button and select *Explore*. In the resulting Explorer

By Lincoln Spector

ILLUSTRATION: JOHN BLECK

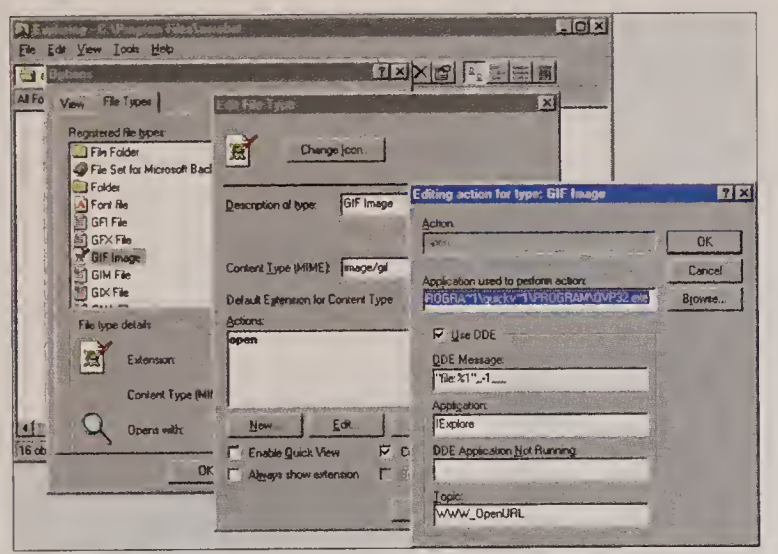


FIGURE 1: CHANGING A FILE EXTENSION'S ASSOCIATION is easy if you know where to look in Explorer.

window, go to the folder equivalent of the menu in which you want to create your Shortcut. For instance, to place the Shortcut in the Programs menu, go to Windows\Start Menu\Programs. Then right-click anywhere in the right pane and select *New•Shortcut*.

Either way, you'll end up on the first page of the Create Shortcut Wizard—and if you're using Internet Explorer 3.*x*, it will prove once again that to Microsoft, ease of use is only skin-deep. Sure, there's only one simple field to fill in on this page, but you have to type in this intuitive command:

c:\windows\explorer.exe /root, c:\windows\Internet Mail. {89292102-4755-11CF-9DC2-00AA006C2B84}

Note that there are only two spaces and four hyphens. If you put in any extra spaces or characters, it won't work.

So why the gobbledygook? Internet Mail isn't a stand-alone program, it's a component of Internet Explorer that can be opened only with this secret code.

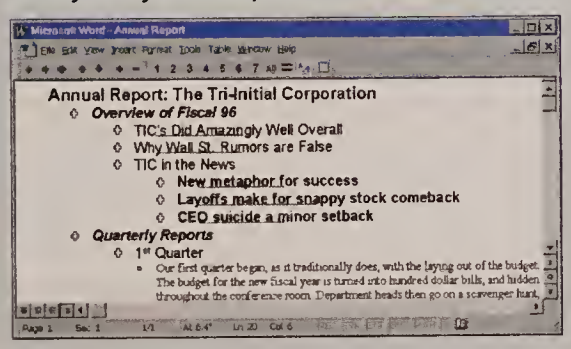
To Microsoft's credit, things have improved considerably with IE 4.0. The new browser's mail module, Outlook Express, is a stand-alone program, so you can launch the mail module independently of IE by simply entering the command **C:\Program Files\Outlook Express\Msimn.exe.** (Your path may vary.)

Once you've typed in either command, click *Next*, give your Shortcut a name, and click *Finish*. Now you don't have to browse through programs to read your mail.

Organize Word Documents With an Outline

YOUR FOURTH-GRADE teacher probably forced you to outline a paper before writing it. In Microsoft Word, the outline *is* the finished product. Or, to be more exact, the outline is simply another view of the finished product.

To outline-enable a document, simply assign the styles Heading 1, Heading 2, and so on to appropriate paragraphs. Then when you want to work with the basic structure rather than your prose, select *View•Outline*. In the resulting view, you'll be able to collapse headings, examine your document's structure, and move sections around with the ease of a child manipulating a grandparent. The screen below is of Word 97, but the outlining feature hasn't changed significantly since Word 2.0.



SHARING A DESKTOP IN WINDOWS 95

LAST YEAR I BOUGHT a Packard Bell PC with Windows 95 installed. According to the setup instructions, a log-on and password screen was supposed to appear when I loaded Windows. It never has. I would like to have users log on when they load Windows 95, and I would like my own setup to be password-protected. How do I go about accomplishing this?

Heather Linnehan
South Hadley, Massachusetts

ALTHOUGH WINDOWS 95 isn't a truly secure operating system, it can give users sharing a single PC their own modestly protected environments. To set up Win 95 for multiple users—allowing each, for instance, to have their own Start menu and desktop—select *Start•Settings•Control Panel* and double-click the *Passwords* icon.

This brings up the Passwords Properties dialog box. If the box has multiple tabs (which it may if you've used passwords before), click the *User Profiles* tab. Select the option with the ungainly title *Users can customize their preferences and desktop settings. Windows switches to your personal settings whenever you log in.* You may also want to check both User Profile Settings in the bottom half of the dialog box (see **FIGURE 2**). Click *OK*, then click *Yes* when asked if you want to restart your PC.

When Windows comes up again—and every time you load Windows from now on—a log-on window will prompt users for a name and password. When you ▶

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I N T E R N E T

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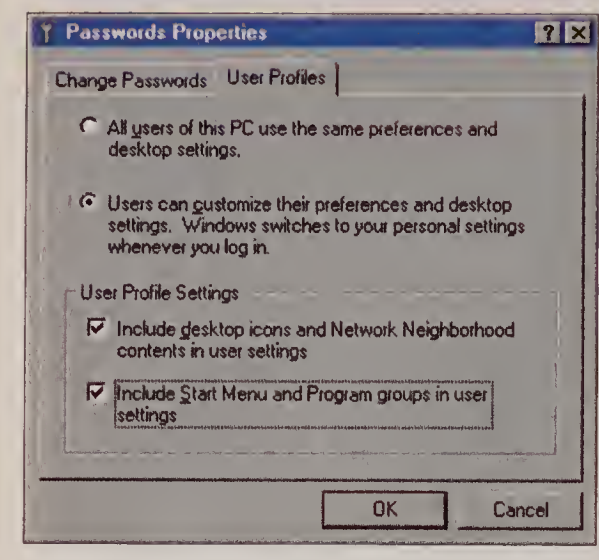
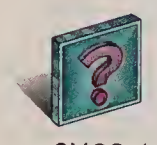


FIGURE 2: PASSWORD-PROTECT your Windows setup by selecting from this dialog box.

type in a new name and password, Windows records them and sets up a new work environment. (The password is optional; if a user leaves it blank the first time he or she types in a name, that name won't require a password.) If you try to log on under an existing name, you won't get through unless you also enter the password, if there is one.

If you get tired of entering names and passwords and decide that everyone can share the same environment, go back to the Control Panel's *Passwords* module, click the *User Profiles* tab, and select the first option, *All users of this PC use the same preferences and desktop settings.*

HARD DRIVE NEEDS POWER



I BOUGHT AN UPGRADE KIT for my PC and installed the new hard drive that came with the kit, but the CMOS doesn't see it. If I unplug and replug the hard drive's power cable, the system boots properly. Can you solve this problem?

Terry Shanklin
Cleveland Heights, Ohio

I'M ASSUMING THAT by "power cable" you mean the thin cable that comes out of the PC's power supply and plugs into the hard drive. It sounds as if you have a bad connection.

The first thing you'll have to do is open up your machine and swap the power cable that goes to the hard drive with another one—say, the power line to the floppy drive. Then start using your system again and see what happens.

If the problem persists, the bad connection lies with your hard drive. Since it's new, you should contact the vendor and demand a replacement.

If your computer now sees the hard disk but can't find the floppy drive, the offending connector is attached to your power supply. If your PC doesn't have any available connectors, there's no easy way to replace just the connector or the cable; you'll have to buy a new power supply. Luckily, they don't cost much: You should be able to get a good one for about $45.

If, when you switch cables, the problem simply disappears, cross your fingers and hope it stays away.

THE LONG AND SHORT OF FILE NAMES

I HAVE A MAJOR PROBLEM that I can't solve. After I installed some freebies and shareware, several of my programs can't find their associated files. After some trial and error, I discovered that the DOS name for my Program Files folder had changed from 'progra~1' to 'programf'. I've tried to rename the folder in DOS, but that also renames the long Windows 95 file name, causing all sorts of additional trouble. How do I fix this problem?

Thomas Healy, Tigard, Oregon

SOMEWHERE ALONG the way, you or a program changed the way Windows 95 extrapolates a short file name from a long one, so a file that's called 'this name is long .doc' becomes 'thisname .doc' instead of 'thisna ~1.doc'. (And if there's already a 'thisname.doc' in the folder, the new file becomes 'thisna~1.doc'.) Then something else—perhaps one of those new installations—forced the Program Files folder to rename itself, keeping the old long name but acquiring the DOS name 'programf'.

Here's the solution: First, rename the Program Files folder something that doesn't begin with the word *program*—say, **Something Else** (don't worry about the warnings you'll get). Then create a new folder whose first eight characters are 'programf'—say, **Program Flops.** Next, rename 'Something Else' back to **Program Files.** Your Program Files folder will again have the short file name 'progra~1'. Finally, delete 'Program Flops'.

SAVE DISK SPACE WITH THE ULTIMATE CLUSTER TRICK

I'VE RECENTLY LEARNED that the Windows 95 OSR2 version of the format program contains an undocumented /z switch that allows the user to specify a cluster size smaller than the default 4K. This appears to solve the cluster waste problem once and for all!

I would like to reformat my 1.2GB drive using /z:1 to achieve the highest efficiency of 512-byte size allocation units. Is it possible that by using a cluster size that does not officially exist, I may introduce a potential for incompatibility that will cause problems with some programs? Is there any other potential danger that may arise with this approach?

Bill Liu, Baldwin Park, California

THE /Z PARAMETER isn't a fluke—Microsoft put it there on purpose. There are only three sizes you'd want or be able to choose: **format /z:1** creates 512-byte clusters; **format /z:2**, 1K clusters; and **format /z:4**, 2K clusters. The trick has worked fine for me. The only drawbacks are that 512-byte clusters limit the size of your hard disk partition to 2GB, and that large files stored in smaller clusters can require more time to read from the disk. The performance difference may not be perceptible, however. To confirm that you're using a smaller cluster size, enter the command **chkdsk** at a DOS prompt or from the *Start•Run* dialog box (see **FIGURE 3**). ▶

```
D:\>chkdsk

CHKDSK has NOT checked this drive for errors.
You must use SCANDISK to detect and fix errors on this drive.

Volume Serial Number is 3950-15F0

  585,276,928 bytes total disk space
  583,851,520 bytes available on disk

          512 bytes in each allocation unit
    1,143,119 total allocation units on disk
    1,140,335 available allocation units on disk

      655,360 total bytes memory
      615,152 bytes free

Instead of using CHKDSK, try using SCANDISK.  SCANDISK can reliably detect
and fix a much wider range of disk problems.
```

FIGURE 3: SQUEEZE EVERY BYTE of space from your hard disk with the format command's /z switch. Confirm cluster size by using chkdsk.

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FAT, FATTER, AND FATTEST FILE SYSTEMS

WHEN I VIEW the current partition information on my 8-year-old PC using DOS's fdisk utility, it says the file system is FAT12. When I do the same on my newer PC, it says FAT16. I know about the differences between FAT16 and FAT32, but I can't find much on FAT12. What are the differences between these file systems?

Rick Channing
New London, Connecticut

NOT TO WORRY—FAT12 is merely DOS's way of maximizing the available space on your no-doubt tiny partition. When you create a partition smaller than about 16MB with fdisk (in any DOS, Windows 95, or NT version) and then format it, you get 12-bit file allocation table, or FAT, entries—how the file system keeps track of file names, attributes, and locations—instead of the normal 16-bit version.

It works just the same as the standard FAT16 file system, and it's readable by DOS, Windows 95, Windows NT, and OS/2. Whether you can install anything on such a small partition in these days of 125MB office suites (or run it on such an old PC) is a separate issue.

FREEING UP MEMORY

LACK OF MEMORY is slowing down my applications. I recently downloaded a utility that shows memory usage, and with Windows 95 it usually tells me I have only about 1.5MB of RAM free! I have a total of 16MB and plan to upgrade to 32MB. How can I free more RAM in Win 95?

Michael A Reinboth
Redondo Beach, California

THIS IS A CONSTANT PROBLEM for all computer users—there's never enough memory or hard drive space. And unfortunately, there's no easy solution.

If your computer is slow and you suspect that a lack of memory is to blame, reduce the number of programs running at the same time. Also, try the following:
- Close one app before launching another.
- Turn off that fancy wallpaper.
- Reduce the number of utilities running in the background. (The one that shows RAM usage eats up memory itself.)

Don't be tempted by software packages that promise to increase your effective memory by compressing data or juggling RAM. Every time the PC World Test Center has examined such programs, they've come up wanting.

In the end, the best approach is probably to do what you're already planning: Buy more RAM. It's easier in the long run to fix the problem than to work around it.

HOW FAST IS MY MODEM, REALLY?

I RECENTLY INSTALLED a new .inf file for my modem to boost its speed from 28.8 kbps to 33.6 kbps. Before doing so, Dial-Up Networking's status box reported a connection speed of 115.2 kbps. Now that the new .inf file is installed, the maximum speed I can get is 33.6 kbps. Is there something I can tune somewhere to get the faster connections I had before?

Dominique Lefèvre, Kuwait

DON'T WORRY, you're almost certainly making faster connections now than you were before loading the new .inf file (the driver installation file that tells Windows about your modem's capabilities). Even though Dial-Up Networking previously reported a connection speed of 115.2 kbps, common sense dictates that a 28.8-kbps modem can't really connect at such a high speed. What you saw was a quirk of your old .inf file, which for some reason decided to report the *DTE speed*—the rate of the connection between your modem and PC. The actual connection speed was probably 28.8 kbps or slower.

It's worth noting that .inf files aren't drivers and don't themselves upgrade your modem to a faster speed. The situation you're in occurs when you install a 33.6-kbps modem under the original August 1995 version of Windows 95 (version 4.00.950) or upgrade your 28.8-kbps modem's firmware to support 33.6-kbps transmissions. Windows 95 shipped with few .inf files for 33.6-kbps modems, so Plug and Play misidentifies your unit as a 28.8-kbps model. Installing an updated .inf file corrects this error.

Answer Line *welcomes your questions and pays $50 for published items. Lincoln Spector is a contributing editor for* PC World. *See page 14 for contact information.* ■

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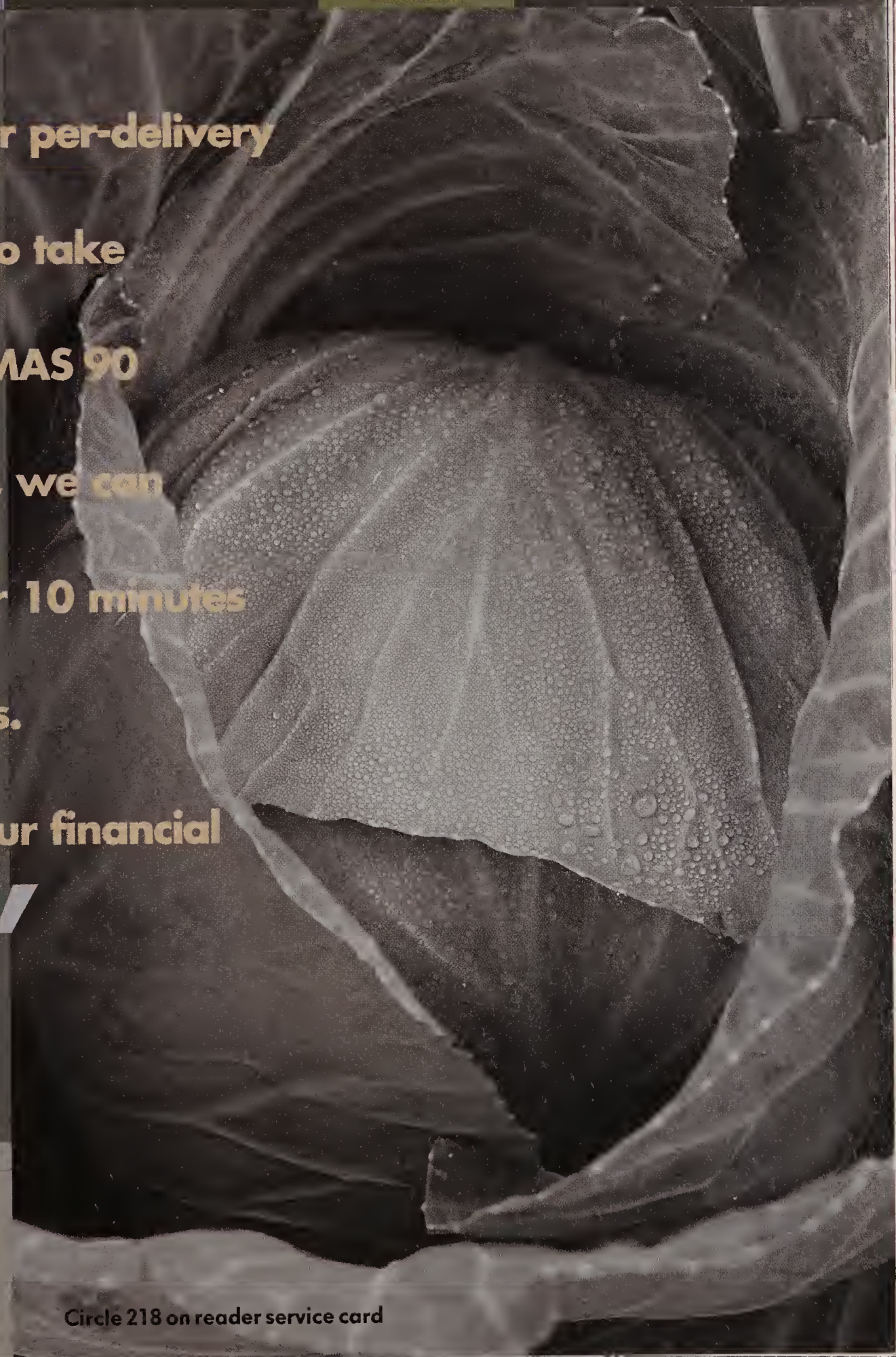

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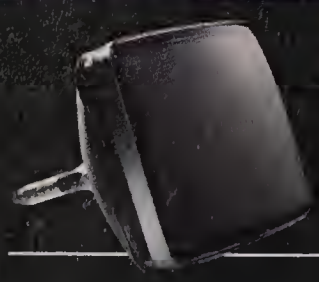

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Print your root directory ◆ Solve printing problems ◆ Fine-tune Norton's Undo

All-Time Top Ten Tips for Mouse and Keyboard

THERE ARE DOZENS of keyboard and mouse maneuvers that get you around Windows fast. Here are my faves. If I've missed any good ones, let me know. I'll publish the best in a future issue.

1. The old switcheroo. If you work with more than one application at a time, pressing **<Alt>-<Tab>** is a quick way to get back to the last application you used. To cycle through all running apps, hold down the **<Alt>** key and press **<Tab>** repeatedly until the icon for the application you want is selected. If you're still pressing <Alt> and change your mind midstream, press **<Esc>**, then let go of the keys. Finally, in most applications that display multiple windows within the main program window (except Microsoft Word), **<Ctrl>-<Tab>** and **<Ctrl>-<Shift>-<Tab>** cycle you through the open document windows.

2. The max factor. You can maximize any window (application or document) by double-clicking its title bar. Doing the same to a maximized application's title bar restores it to its previous state.

3. Other hidden clickables. When it comes to mousing around, the general rule is to single-click buttons and double-click icons. (The control menu icon in Windows 3.*x* applications is an exception—double-clicking it closes the window.) But sometimes the best approach is to click in a completely empty area. Click the empty area of a scroll bar to scroll one screen at a time. In Windows 3.*x*, press **<Alt>** as you double-click a blank area in a Program Manager group to create a new Program Item, and double-click the desktop to see the Task List, a tool for arranging windows and icons and closing programs. In Win 95 and NT 4.0, right-click the desktop or the empty area of a folder window to see a menu for arranging icons, creating new folders and files, or modifying properties. Right-click a blank area of the Taskbar to arrange windows (or even *un*arrange them) or to set Taskbar preferences.

4. Menu magic. To access menus from the keyboard, hold down **<Alt>** as you press the underlined letter in the menu name. Then press the underlined letter of the command you want to execute (**FIGURE 1**). If a menu item has no underlined letters (such as in Windows 95's Start menu), press the first letter of the menu item. If multiple menu items share the same underlined or initial letter, press it repeatedly until the item you want is highlighted; then press **<Enter>**. In dialog boxes, pressing **<Alt>** plus an underlined letter moves you to the option or executes a command button (the kind with the 3D look). Don't forget that **<Ctrl>-<Esc>** displays the Start menu in Windows 95 and NT 4.0 and the Task List in Windows 3.*x*.

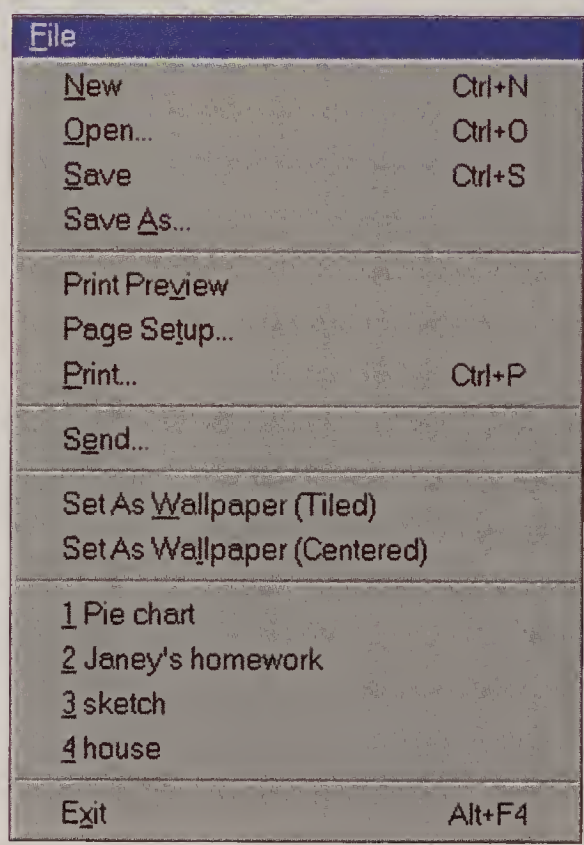

FIGURE 1: EXECUTE MENU COMMANDS from the keyboard by pressing <Alt> plus the underlined letter, or by using the combinations on the right.

5. Dialog dance. In almost any dialog box, you can press **<Tab>** to move among available options. Each time you press it, the next option is highlighted. (Press **<Shift>-<Tab>** to reverse the direction.) If a dialog box has tabs along the top, press **<Ctrl>-<Tab>** to switch among them. If an option button (radio button) is highlighted, use the arrow keys to move to the next, or press the space bar to toggle a check box or execute a command button. Press **<Alt>** plus a down arrow to open a drop-down list, then press the first letter of the option you want. Pressing **<Enter>** activates the button with the heavy black outline. Press **<Esc>** to cancel the whole dialog box.

6. Text tricks. Keyboard shortcuts can also help you get around text screens, and a surprising number of e-mail packages, word processors, utilities, and other programs use these same shortcuts: Hold down **<Ctrl>** as you press the left or right arrow key to move the cursor one word at a time. Press **<Home>** or **<End>** to move to the beginning or end of a line. Press **<Page Up>** or **<Page Down>** to scroll one screenful. Press **<Ctrl>-<Home>** or **<Ctrl>-<End>** to move to the top or bottom of a document.

7. Selection city. In almost all Windows applications, <Shift> means *select*. Hold down **<Shift>** while pressing the arrow keys to select characters as you move the cursor. To add to the selection one word at a time, hold down **<Ctrl>-<Shift>** as you press the left or right arrow key. Click one spot in your text, then press **<Shift>** as you click another to select all the text in between. To select multiple, contiguous items in a list, click the first item, then hold down **<Shift>** as you click the last item. To select multiple, noncontiguous items, press **<Ctrl>** as you click each one.

8. Edit tricks. Once you've selected an object, you're ready to act on it. Although I still like the old Windows shortcuts for cutting (**<Shift>-<Delete>**), copying (**<Ctrl>-<Insert>**), pasting (**<Shift>-<Insert>**), and undoing (**<Alt>-<Backspace>**), these days more applications use the shortcuts that originated with the Macintosh: **<Ctrl>-x** for cut, **<Ctrl>-c** for copy, **<Ctrl>-v** for paste, and **<Ctrl>-z** for undo. ▶

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9. File fundamentals. Many but not all applications—the shocking exceptions include Notepad, Cardfile, Write, and Help—follow these timeworn keyboard shortcuts: **<Ctrl>-n** creates a new file, **<Ctrl>-o** opens a file, **<Ctrl>-p** prints, and **<Ctrl>-s** saves a file. Though it's less common, many applications use **<Ctrl>-f** for displaying a Find or Search dialog box. Pressing **<Alt>-<F4>** closes (exits) nearly any application window. Many document windows can be closed with **<Ctrl>-<F4>**, although programs ported from the Macintosh sometimes use **<Ctrl>-w**.

10. Cry for help. When all else fails, press **<F1>** for online help.

RUN LIKE THE WIND

WINDOWS 95's Start menu gives you numerous opportunities to create menus and submenus for launching applications and files. But if your menus are getting cluttered, or if you'd rather type than hunt through layers of menus, consider revving up the Run command with this tip from Daniel Henry of Sioux Falls, South Dakota.

First, use Explorer to locate an application or file that you open a lot (but not so frequently that it should be on your Start menu). Select the application or document file and choose *Edit•Copy*. Now navigate to your Windows Command folder (probably c:\windows\command) and choose *Edit•Paste Shortcut*. Next, make sure the new Shortcut is selected, press **<F2>**, and enter a new, shorter name for your file—something that would be easy to type. For example, if you pasted a Shortcut to Microsoft Paint, you might type **paint** or even just **pnt** (see **FIGURE 2**).

That's all there is to it. Now when you want to open this file, choose *Start•Run* (or press **<Ctrl>-<Esc>** and then **r**), type the name of your Shortcut, and press **<Enter>**.

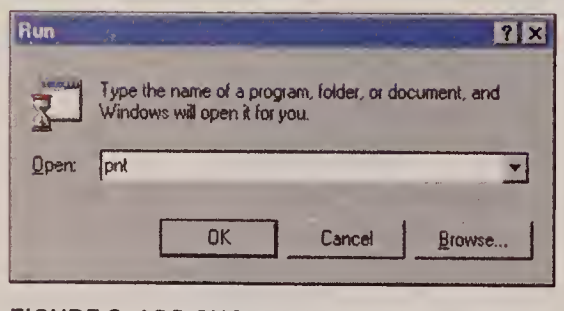


FIGURE 2: ADD SHORTCUTS to Windows' Command folder to speed up your Run commands.

PRINT EVEN MORE DIRECTORIES

A NUMBER of readers were pleased to learn how to add a "print directory" feature to Windows 95 (see "Print Directory Lists," in July's *Windows Tips*). But a few people wanted to print a drive's root directory, which the tip as published couldn't do.

This fix will make it work: Simply associate the batch file with the Folder file type rather than with the File Folder type.

First, follow the directions in the July issue for making a directory-printing batch file. Then start Explorer and choose *View•Options*. Click the *File Types* tab. Select the *Folder* type (not File Folder) from the list of Registered file types and click the *Edit* button. In the Edit File Type dialog box, click *New*. In the Action box, type something like **Print directory**. In the 'Application used to perform action' box, type the path and name of your batch file. Then click *OK* and close each remaining dialog box.

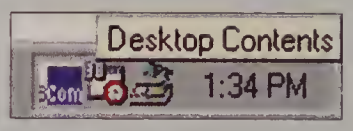
Follow the rest of the instructions in the July issue. If you've already implemented the tip, you can easily delete the extra command from your pop-up menu: Choose *View•Options* in Explorer, click the *File Types* tab, select the *File Folder* type, and click *Edit*. Select your directory-printing command in the Actions list and click *Remove*. Click *Yes* to confirm, and close all dialog boxes.

A final tip: If this batch file system does not work with your printer (PostScript models can't handle it), check out ExpPrint, a shareware utility from JD Design that lets you print directories, with plenty of options for customization (**FIGURE 3**). Download an evaluation version from ourworld.compuserve.com/homepages/jdd or from PC World Online. The cost is $25 for a bundle containing ExpPrint and four other utilities; the registration fee for ExpPrint alone is about $8.

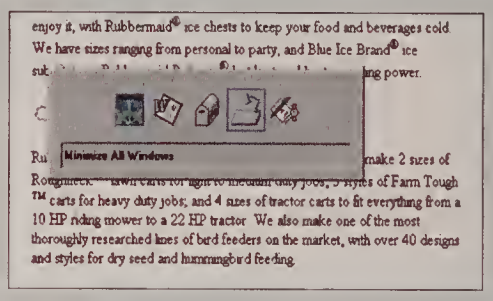
W I N D O W S T O O L B O X

Quick Access to the Desktop

HOW OFTEN HAVE YOU wanted something on your desktop, but the screen was obscured by a bazillion windows? Here are two cheap solutions: If you just want a desktop object, try DeskMenu, part of the free Microsoft PowerToys (available from PC World Online or www.microsoft.com/windows95/info/powertoys.htm). It also comes standard with Internet Explorer 4.0. Just click the *DeskMenu* icon in the tray area of the Taskbar to see a menu of the desktop.



But if you want to see the actual desktop in all its glory, here's a different approach: Tab2Desk lets you minimize all applications using the **<Alt>-<Tab>** shortcut you use to switch between applications. The desktop appears as an item on your <Alt>-<Tab> list just like other applications.



Tab2Desk is part of a $25 package of utilities from JD Design; see the tip "Print Even More Directories" for details, or look for the file on PC World Online.

ROOT OUT PRINTING PROBLEMS

IF YOUR ATTEMPTS at printing documents result in mysterious 'Cannot print' messages, the first place to look is the root directory of your hard disk. If the number of files there is close to 512 (the maximum allowed), Windows' Print Manager may not be able to create the temporary files it needs.

The obvious solution is to clean house, or at least your root directory. But how did it get so clogged in the first place? The ▶

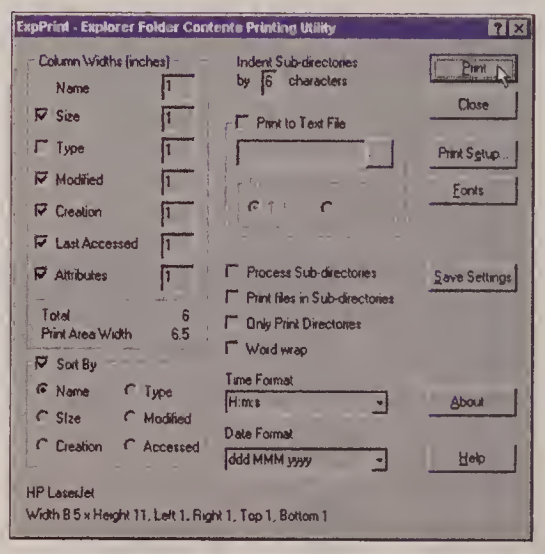


FIGURE 3: PRINT DIRECTORY LISTINGS using the ExpPrint shareware utility.

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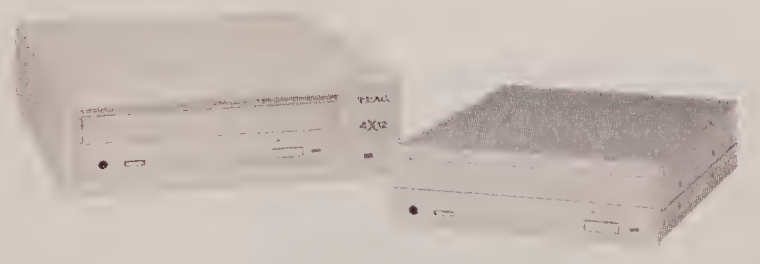

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answer may lie in your autoexec.bat file. Does it contain a line that begins 'set temp='? If this line is not present, or if it points to the root ('set temp=c:\') or a nonexistent directory, then all temporary files—which apps create for interim storage—end up in the root.

To solve this problem, first exit Windows and type **del c:*.tmp** at the DOS prompt. While you're there, look for any other files that belong elsewhere, and move them to their proper directories. Finally, type **edit autoexec.bat**. Look for the 'set temp=' line and make sure it reads **set temp=c:\windows\temp** (or another directory designed to hold such files). Save the file and restart Windows. At least one of your printing problems has now been solved.

DO DO THAT UNDO THAT YOU DO SO WELL

EVEN IF YOU never use Norton Navigator's File Manager, its Undo feature could one day save your bacon. When you screw up in Windows' Explorer, you can undo only your last action. But Norton File Manager lets you reverse any of your last 9999 actions. It can't remember everything or do the impossible—say, undelete a file destroyed years earlier. But it sure beats a single undo. More to the point, Norton Navigator keeps track of these events for you, even if you don't normally use its File Manager.

You can't turn on this feature in the Configure Undo dialog box, though. To get Navigator to remember file tasks that happened outside of File Manager, start the Norton Navigator Control Center. In the left pane, select *Norton Undo*. In the right pane, check *Track all Windows 95 file operations* and click *OK* (see **FIGURE 4**).

FIGURE 4: UNDO THOUSANDS of actions even if you don't normally use Norton File Manager.

From now on, Navigator will be keeping tabs on what you do. If you regret something you've done, start Norton File Manager and choose *Edit•Undo*. The list of actions shows you what Navigator has been watching and may include a number of events you don't normally think of as file management. When you're sure you have found the action you want to change, select it and click *Undo*. Then click *OK*.

CUSTOMIZE NORTON NAVIGATOR'S UNDOINGS

IF YOU TURN ON Norton Navigator's undo feature (see the tip above), it will be constantly monitoring your file management behavior so you can change your mind later if need be. But some files are of such minimal importance that letting them take up space on Norton's ever-changing list of undoable actions makes little sense. If you notice that it's tracking files you'd rather forget about, you can add them to Norton's exception list—a listing of items that Norton ignores when it's undoing actions. Here's what to do:

First, make a backup copy of these files in the Windows folder: user.dat, user.dao, system.dat, and system.dao. (If you don't see them, choose *View•Options* in My Computer or Explorer, click the *View* tab, select *Show all files*, and click *OK*.)

Next, enter the Registry Editor: Select *Start•Run*, type **regedit**, and press **<Enter>**. Then navigate through the tree in the left pane until you come to the branch HKEY_LOCAL_MACHINE\SOFTWARE\Symantec\Navigator\SYMFSV4\Undo\Exception. With *Exception* selected in the left pane, make a note of the highest-numbered icon in the right pane. To add an exception (for instance, to make Norton ignore all .bak files), right-click in the right pane and choose *New•String Value*. Name the new icon by typing the next-highest number in the folder (for example, **7** if the folder has items numbered 0 through 6). Press **<Enter>** twice—once to complete the naming process and again to open the Edit String dialog box. Under Value Data, type the file extension you want ignored (for example, ***.bak**) and press **<Enter>**. Repeat these steps to add any number of new icons, numbering them in sequence.

When you're through, double-click the *Count* icon and change its Value Data to the total number of string icons in the folder. Click *OK* and exit the Registry Editor, then exit and restart Windows.

Find files from this article at www.pcworld.com/files. Windows Tips *pays $50 for published tips and questions. Contributing Editor Scott Dunn is a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995, 800/283-9444).* *See page 14 for information.* ■

Tell Setup Where to Go

WHEN I PURCHASED my laptop PC, the compressed "cabinet" (.cab) files, in which Microsoft distributes Windows 95, were included on the hard drive. After I backed them up using Microsoft Create Disks, Windows 95 assumed that the .cab files were residing on my floppy drive. Now that I have Windows 95 on CD-ROM, I'd like to use that version whenever Windows needs a specific .cab file. But Windows won't let me specify the path. How can I make it recognize my CD-ROM drive?

Justin Kuo, Lexington, Kentucky

YOU'RE NOT THE only one with this problem; it can afflict anyone who installs a CD-ROM drive or makes other system changes that affect the drive letter of their original Windows 95 installation. Fortunately, you can fix it by editing the Windows Registry.

As a precaution, first make a backup copy of these important files in the Windows folder: user.dat, user.da0, system.dat, and system.da0. (If you don't see them, choose *View•Options* in My Computer or Explorer, click the *View* tab, select *Show all files*, and click *OK*.)

Now start the Registry Editor: Choose *Start•Run*, type **regedit**, and press **<Enter>**. Then navigate through its branches until you come to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Setup. Now, select the *Setup* icon in the left pane, and double-click *Source Path* in the right pane. In the Value Data box, type the new drive letter and path to the Windows 95 source files—for example, **f:\win95\setup** (your path may vary). Then click *OK* and exit the Registry Editor.

The next time you run Windows Setup, it should know where to look.

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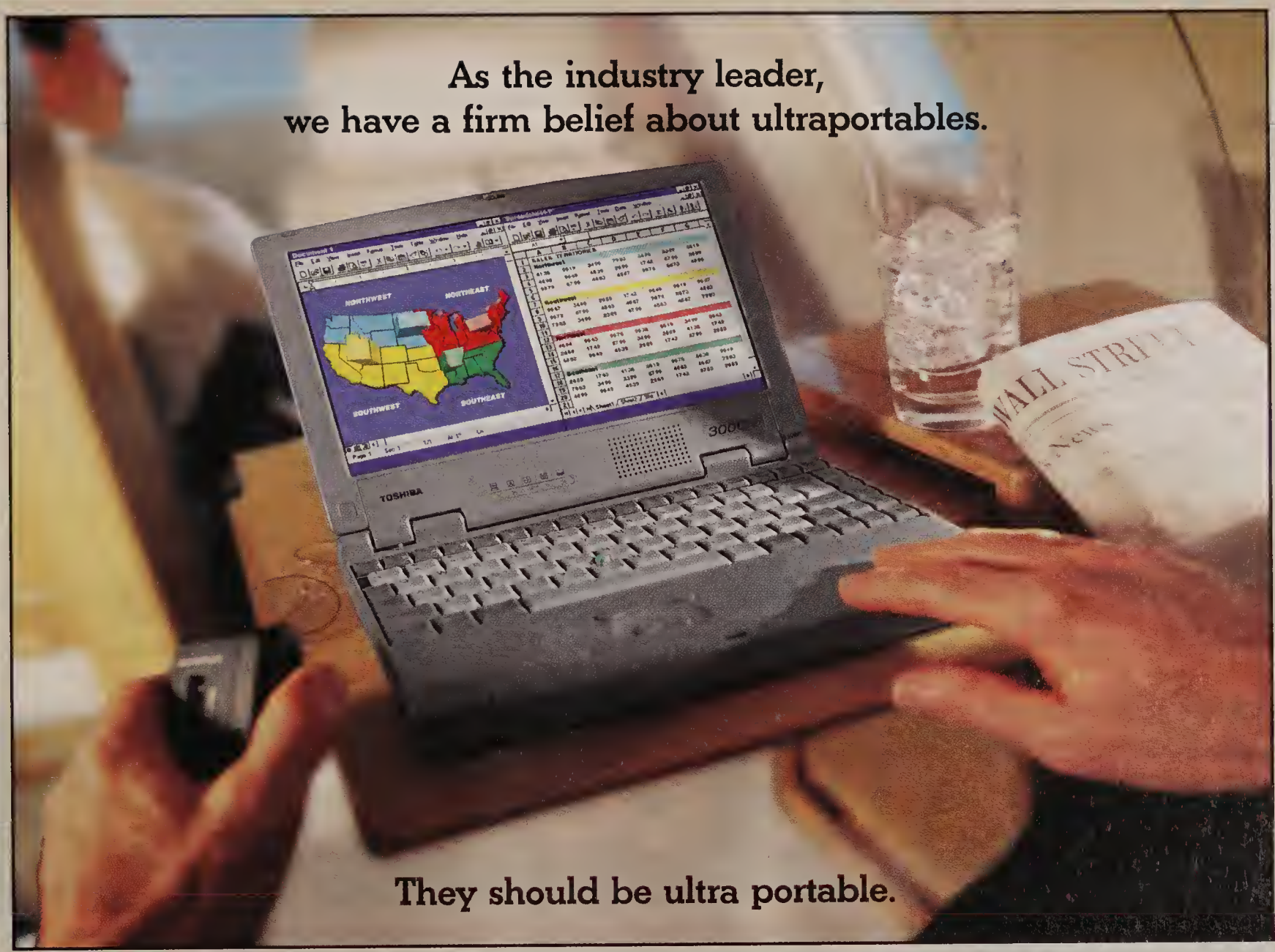

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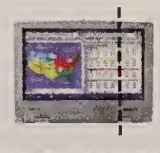

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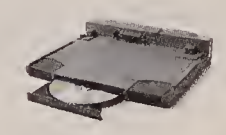

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- Zoom Video and USB Ports
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Gantt Charts in Excel

I'VE HEARD you can create a Gantt chart using Excel, but Gantt charts are not listed as an option. Am I missing something?

Gail Buller, Dixon, California

NOPE. EXCEL doesn't offer Gantt as a chart type, but it's fairly easy to create such a chart by using a stacked bar chart. Follow these steps:

1. Start with a new workbook and enter your task data, as shown in **FIGURE 1**. Column A contains the task descriptions; column B, the start date for each task; and column C, the number of days to complete the task. Column D contains formulas that determine the completion date for each task. For example, the formula in cell D2 is =B2+C2-1. Column D isn't essential, but including it will tell you exactly when a particular task is scheduled to end.

gantt.xls

	A	B	C	D
1	Task	Start Date	Duration	End Date
2	Planning Meeting	12/29/97	1	12/29/97
3	Develop Questionnaire	12/30/97	11	1/9/98
4	Print and Mail Questionnaire	1/13/98	9	1/21/98
5	Receive Responses	1/16/98	15	1/30/98
6	Data Entry	1/16/98	18	2/2/98
7	Data Analysis	2/3/98	4	2/6/98
8	Write Report	2/9/98	12	2/20/98
9	Distribute Draft Report	2/23/98	1	2/23/98
10	Solicit Comments	2/24/98	4	2/27/98
11	Finalize Report	3/2/98	5	3/6/98
12	Distribute to Board	3/9/98	1	3/9/98
13	Board Meeting	3/17/98	1	3/17/98

Sheet1

FIGURE 1: THIS DATA can be plotted in a format that resembles a Gantt chart.

2. Create a stacked horizontal bar chart from the data in range A2:C13. The Chart Wizard will probably guess these series incorrectly, so you'll need to set the category axis labels and data series manually. The category (*x*-axis) labels should be range A2:A13; the Series 1 data, B2:B13; and the Series 2 data, C2:C13.
3. Remove the chart's legend, and adjust the chart's height (or change to a smaller font) so that all *x*-axis labels are visible.
4. In the Format Axis dialog box, select the following Scale options for the *x*-axis: *Categories in reverse order* and *Value (y) axis crosses at maximum category*. This displays the tasks in order from top to bottom.
5. Access the Format Axis dialog box for the *y*-axis. Set the Minimum and Maximum values to correspond to the earliest and latest dates in your project. Note that you can enter actual dates into this dialog box. To display weekly intervals, set the Minimum to a Monday, the Maximum to a Sunday, and the Major Unit to **7**.
6. Select the data series that corresponds to the data in Column B and go to the Format Data Series dialog box. Set Border to None and Area to None. This hides the first data series—the start dates—making the chart resemble a Gantt chart.
7. Apply other formatting as desired. For example, you can add grid lines and a title. **FIGURE 2** shows the completed chart after some touch-up work.

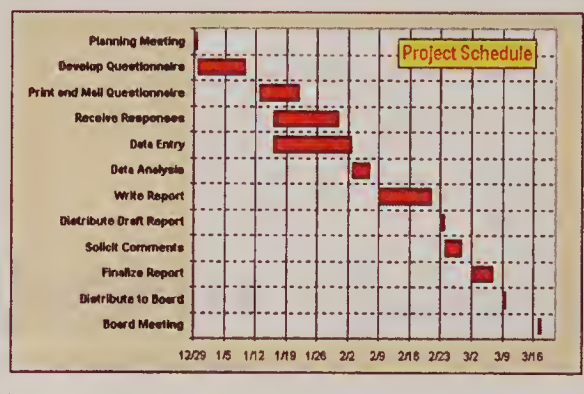

FIGURE 2: WHAT LOOKS LIKE a Gantt chart is actually a stacked bar chart.

If you adjust your project schedule, the chart will be updated automatically. If you use dates outside the original date range, you'll need to change the scaling for the *y*-axis.

COUNT WORDS IN A CELL

I USE EXCEL TO manipulate text and often need to count the words in a cell. I use the LEN function to return the number of characters, but I can't figure out how to count the words. I'd prefer to avoid using a macro if possible.

Peter Courtland, Boston

PERHAPS THE SIMPLEST solution is to write a custom VBA worksheet function. But since you prefer a nonmacro solution, I developed a rather complex array formula. The number of words in a cell is equal to the number of space characters (character code 32), plus 1. Use the following array formula to return the number of words in a cell (in this case, cell F9):

```
=sum(if(mid(trim(F9),row($A$1:offset
($A$1,len(trim(F9))-1,0)),1)=char(32), 1,0))+1
```

To enter an array formula, press **<Ctrl>-<Shift>-<Enter>** rather than just <Enter>. Excel identifies an array formula by placing brackets around the formula. Notice that this formula uses the ROW function, with a reference to cell A1. This is a trick that generates an array of consecutive integers beginning with 1 and ending with the number of characters in the cell. This integer array is then used as the second argument for the MID function. The formula also uses the TRIM function, which eliminates any excess spaces that would result in an incorrect word count.

SHRINKING 1-2-3 RELEASE 97'S INFOBOX

I'VE UPGRADED TO 1-2-3 release 97, and I really like the always-on-top InfoBox for formatting my worksheets. But sometimes it's annoying and gets in the way. Any suggestions?

Rita Ingress, Dallas

THE INFOBOX makes formatting any selected object a breeze, but it does tend to hide important information. You can move it by dragging its title bar or close it and then reopen it as needed. However, if you prefer to keep it on screen, but reduced in size, double-click its title bar. The tabs remain visible (see **FIGURE 3**), and when you click a tab, the InfoBox is restored to its full size.

FIGURE 3: DOUBLE-CLICK the title bar of 1-2-3 97's InfoBox to shrink the box to this array of tabs.

Spreadsheets *welcomes your questions and tips and pays $50 for published items. Contributing Editor John Walkenbach is the author of nearly two dozen spreadsheet books and maintains* The Spreadsheet Page *(www.j-walk.com/ss/).* *See page 14 for contact information.* ■

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In Word 97: As you create your document, mark headings, subheadings, and other important locations as bookmarks. To do this, position the cursor at the location you want to mark, then select *Insert•Bookmark*. In the Bookmark dialog box (see **FIGURE 1**), type a unique name for the bookmark, inserting an underscore character between each word, and click *Add*.

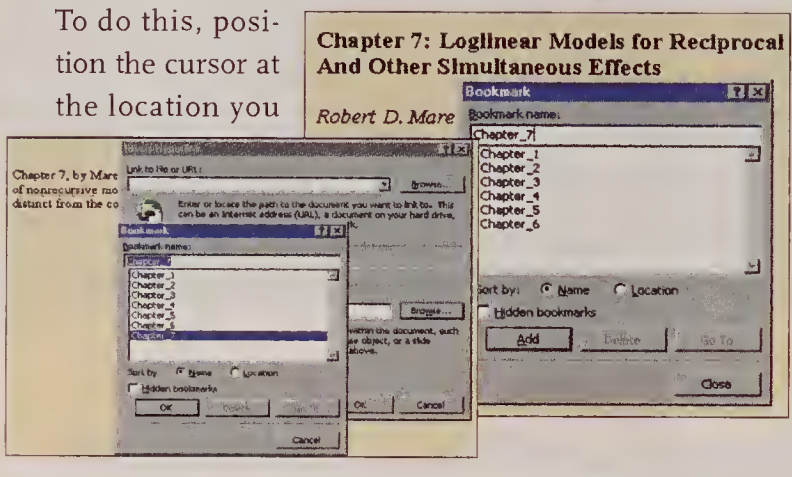

FIGURE 1: INSERT HYPERLINKS for important sections to help your readers navigate a long document.

Once you've created your bookmarks, you can create hypertext links to them. First, highlight the text you want to use as a hyperlink; for example, you might use the words *Chapter 7* as the link to Chapter 7 itself. Select *Insert•Hyperlink* (or press **<Ctrl>-K**). In the Insert Hyperlink dialog box (see the left side of Figure 1), click *Browse* in the lower half of the dialog box, select the appropriate bookmark in the Bookmark dialog box, and click *OK* twice to finish the job. Your highlighted text will appear underlined and in a different color in the text. Repeat this step as needed to create links to all your bookmarks.

In WordPerfect 7 and 8: As you create your document, mark its headings, subheadings, and other important locations as bookmarks. To do this, place the cursor where you want the bookmark. Select *Tools•Bookmark* (if you're using version 8) or *Insert•Bookmark* (if you're using version 7). Then click *Create*, type a name for the bookmark, and click *OK*.

To create hypertext links to your bookmarks, highlight the text you want to use as a hyperlink, and select *Tools•Hyperlink* (in version 8) or *Tools•Hypertext/Web Links* (in version 7). In WordPerfect 8, click the *Bookmark* drop-down list in the Hyperlink Properties dialog box, then select the appropriate bookmark and click *OK* to create the link. In WordPerfect 7, click *Create* on the Hypertext tool bar. Select *Bookmark* in the Create Hypertext Link dialog box, then choose a bookmark after pulling down the associated list. Click *OK* to mark the selected text as a Hypertext link.

STOP AUTOMATIC WEB LINKS

IN THE LATEST WORD processors, it's a snap to add a different kind of hyperlink—one that points to another document anywhere on the Internet or on your intranet. In fact, Word 97 and WordPerfect 8 create hyperlinks automatically by default when you type an Internet address: Click on the link, and you go directly to that location on the Net. But sometimes this feature can be a pain. If you don't want it, here's how to turn it off.

In Word 97: Select *Tools•AutoCorrect*. Click the *Autoformat As You Type* tab in the AutoCorrect dialog box. Next, clear the *Internet and network paths with hyperlinks* check box, and then click *OK*.

To deactivate a hyperlink in a Word 97 document—whether it was created manually or automatically—right-click the hyperlink, select *Hyperlink•Edit Hyperlink*, and click the *Remove Link* button in the Edit Hyperlink dialog box.

In WordPerfect 8: Select *Tools•QuickCorrect*. Click the *QuickLinks* tab in the QuickCorrect dialog box. Uncheck the *Format words as hyperlinks when you type them* check box, and click *OK*.

LIGHTS! CAMERA! ACTION! IN WORD

YOU CAN DRAMATICALLY enhance a Word 97 document by adding a video or sound clip to it—viewers can just click an icon to hear your point or view the CEO's last luncheon speech. If you loaded the Clip Art Gallery when you installed Word, here's the easiest way to add such clips. (Word 95 users can still add these clips but must use the *Insert•Object* command.)

1. Select *Insert•Picture•Clip Art*. Word will display a dialog box reminding you that more clip art choices are available if you insert the CD-ROM. Click *OK*.
2. Select the *Sounds* or *Video* tab, then choose the appropriate sound or video clip from the dialog box.
3. Click *Insert* to place the object at the current cursor location.

Tip: When you insert a video clip, the first frame will appear in the document.

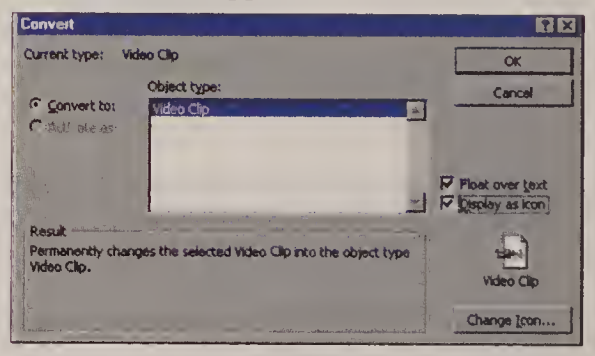

FIGURE 2: ENLIVEN YOUR WORD DOCUMENTS by adding video or sound clips.

To convert the clip to an icon, right-click the image and select *Video Clip Object•Convert*. Then in the Convert dialog box (shown in **FIGURE 2**), click the *Display as icon* check box and click *OK*. ▶

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If you have an Internet connection, just select *Insert•Picture•Clip Art* in Word 97. In the Clip Gallery dialog box, click the *Globe* icon, and then click *OK* to go to Microsoft's Clip Gallery Live site at www.microsoft.com/clipgallerylive/ (shown in FIGURE 3). Select 1 of the 37 categories of images listed on the left side of Microsoft's page, then browse through the available clips shown on the right side of the page. To retrieve the one you want and add it to your local Clip Gallery archive, click the hyperlinked file name under its thumbnail image.

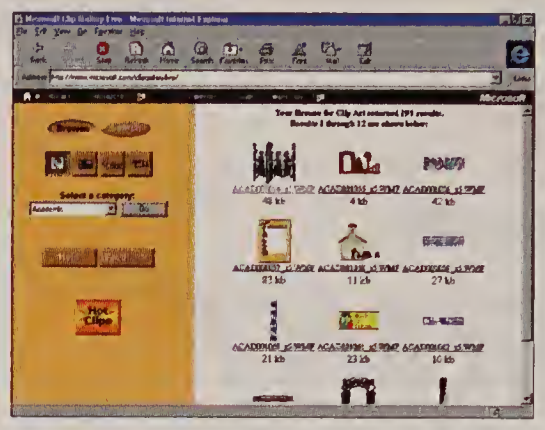


FIGURE 3: MICROSOFT'S Clip Gallery Live offers free graphics, sound clips, and videos.

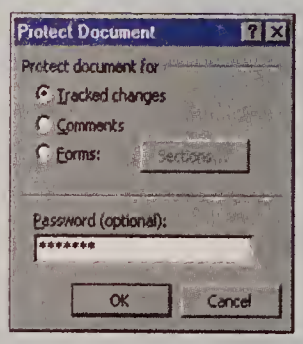
Important: If your browser asks you whether you want to open the clip art file or save it to disk, choose the *Open* option to import the file properly. If you choose to save the file to disk instead, the image will be unusable.

Word Processing *welcomes your questions and tips and pays $50 for published items. Contributing Editor George Campbell is a contributor to* The PC Bible *(Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.* ■

Tracking Changes to Documents in Word 97

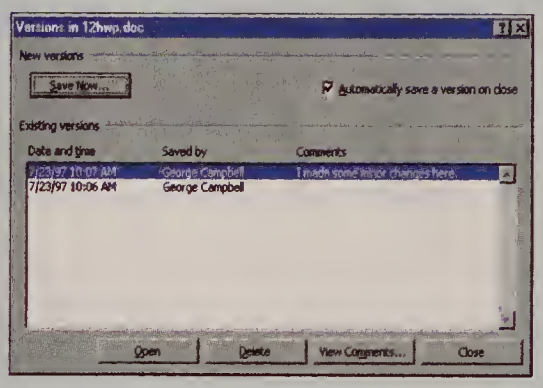
WORD 97'S FEATURES for handling revisions by one or more editors can streamline workgroup projects, but the process can be confusing. Here are a few tips to make these tools work better for you and your cohorts:

Password-protect a document. To ensure that only selected people can change a document, you can password-protect the revision-marking process. After creating a document, select *Tools•Protect Document*. In the Protect Document dialog box, select *Tracked changes* to prevent unauthorized users from accepting or rejecting changes, select *Comments* to allow users to insert comments but not change content, or select *Forms* to allow users to change only certain sections of a document. Type in a unique password.

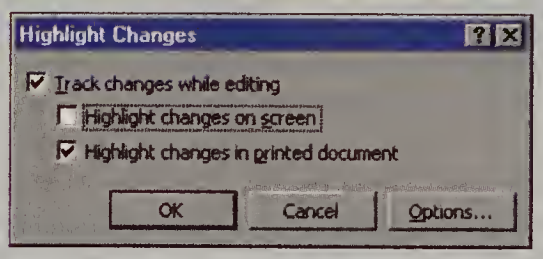


Save all versions. To further ensure the safety of your document, you can tell Word to save a version each time the document is closed or whenever you exit Word. It's best to do this after completing the first draft.

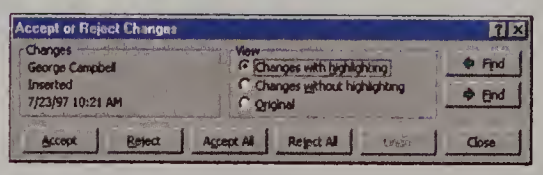
To turn version saving on, select *File•Versions*. In the resulting dialog box, click *Automatically save a version on close*, and click *Save Now*. In the Save Version dialog box, add any comments and click *OK*. In the Save As dialog box, specify a file name and click *OK*. To view or delete a different version, open the current version, select *File•Versions*, and click the version name. Click *Open* to view that version or *Delete* to remove it.



Hide revision marks. To turn off the display of deleted text (and make the document easier to read), select *Tools•Track Changes•Highlight Changes*. In the Highlight Changes dialog box, clear the *Highlight changes on screen* check box and click *OK*.

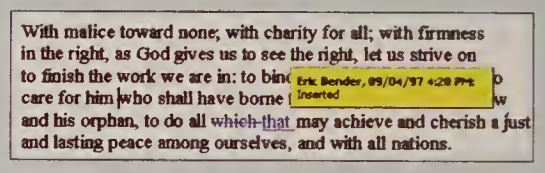


Select an easier toolbar or dialog box. When reviewing a revision-marked document, you can use the Reviewing toolbar to find and manage changes. To display it, right-click any toolbar and select *Reviewing*.

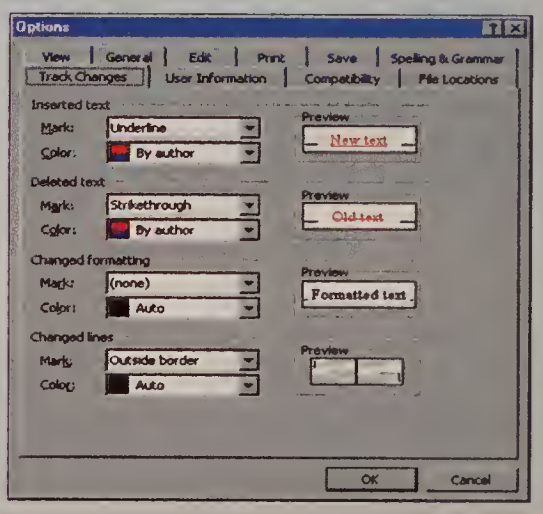


Many users, however, find the toolbar's icons difficult to remember. To use a less cryptic dialog box instead, select *Tools•Track Changes•Accept or Reject Changes*. The resulting dialog box floats on the screen and offers the same options as the toolbar, but in words rather than icons.

Find out who did what—and when. When you rest the mouse pointer briefly over a revision, the name of the editor, along with the date and time of the change, should appear. If it doesn't, select *Tools•Options*, click the *View* tab, and check the *Screen Tips* box.



Select a look. To specify the look of revision marks, select *Tools•Options*, and click the *Track Changes* tab (or right-click the *Trk* button on the status bar at the bottom of the screen and select *Options*). In the Options dialog box, select a color, choose whether you want to strike through or hide deleted text, and indicate how changed lines should be tagged in the margins.



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Filter out spam ◆ Hide Web visits on a shared PC ◆ Protect your 'cyberspace'

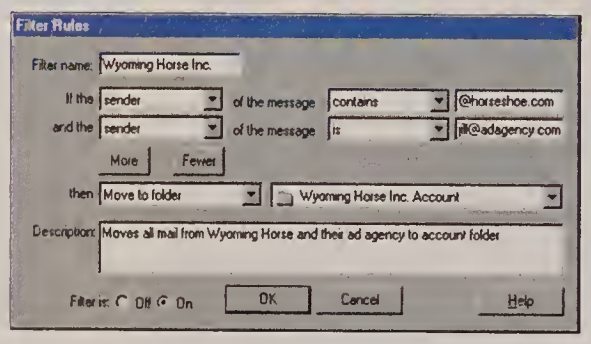
Automate E-Mail Tasks

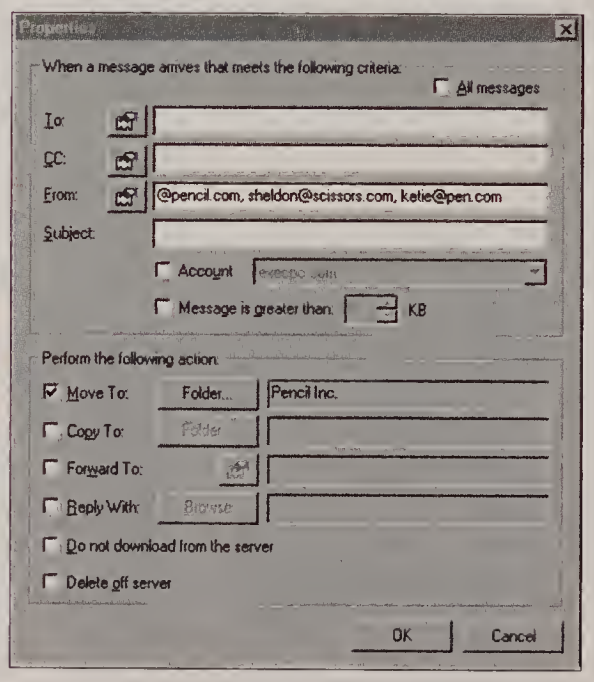
THE WORST THING ABOUT E-MAIL is that there's always too much of it. If you have only one e-mail account for your friends, family, and business associates, you probably find yourself spending too much time sifting through mountains of messages each day, prioritizing some, forwarding or filing others, and nuking what's left. And invariably you delete a message you should have saved, and save a lot of messages you could easily live without.

If your e-mail client is Netscape Communicator 4.01's Messenger or Microsoft Internet Explorer 4.0's Outlook Express, you can have your incoming mail sorted, forwarded, stored, and deleted automatically by subject, sender, and even content.

Mail filtering is especially helpful if you subscribe to one of those conversationally bloated mailing lists. You can set up your browser to funnel the list's daily deluge of chitchat into a special folder for later offline reading. You can also sort incoming mail by address and store messages from certain clients or associates in specified folders. You can even use your browser's mail-filtering functions to help stem the tide of spam.

Internet Explorer 4.0 also lets you set up rules to automatically send out standard replies to messages that meet certain criteria—mail that arrives while you're out of town, for example—and to refrain from downloading big file attachments.





FILTERING RULES in Netscape Communicator (left) and Microsoft Internet Explorer 4.0 (right) let you automatically forward, store, or delete e-mail messages that meet specified criteria.

SORTING MAIL IN COMMUNICATOR 4.01

1. CREATE A NEW FOLDER for storing mail. To load Communicator's Messenger Mailbox, press **<Ctrl>-<Shift>-1** or click the mailbox icon on the components tray. (You may need to enter a password.) Select *File•New Folder,* and in the dialog box enter a folder name (you can designate it as a subfolder of your Inbox or other mail folder). Click *OK.*

2. Select *Edit•Mail Filters* and click *New.*

3. In the Filter Rules dialog box, type a filter name.

4. Click the *If the* drop-down list and choose *sender* to select mail from a specified person, or choose *subject, body,* or *date.* If you want to move the mail from a group of clients to a specific folder, for example, your rules might look like the ones on the left side of the figure below. Click *More* to apply more rules or to specify multiple addresses.

5. In the 'then' field you can specify what you want done with the mail—move it to a folder, delete it, or reprioritize it. You can also choose to watch or ignore messages related to certain threads. If you specify that messages be moved to a folder, you'll need to select the folder from the drop-down list. When you're done, make sure *Filter* is turned on, then click *OK.*

SORTING MAIL IN INTERNET EXPLORER 4.0

1. LOAD OUTLOOK EXPRESS MAIL by clicking the *Mail* icon and selecting *Read Mail* in Internet Explorer. Create a new subfolder in which to store sorted mail by right-clicking the *Inbox* icon. Click *New Folder,* type a folder name, and click *OK.*

2. To create rules for how mail should be sorted into that folder, select *Tools•Inbox Assistant* from the menu, then click *Add.*

3. In the Properties dialog box (see the right side of the figure), type the address of the sender, words from the message's subject, or other properties of incoming mail you'd like filtered. In the From field you can type multiple addresses, separated by a comma, or parts of an address—for example, just the domain name.

4. In the bottom half of the Properties box, specify the action you'd like performed. To move the mail to your newly created folder, check the *Move To* box, click *Folder,* and click *Browse* to find the folder. You can have Outlook Express dispatch replies to certain messages by checking the *Reply With* box, then clicking *Browse* to select a word processing file. Just be sure the file is stored in text-only format, unless your recipient uses the same word processor as you do. Click *OK* when you're finished.

5. Back in the Inbox Assistant, make sure your rule is checked, then click *OK.*

BLOCKING BIG FILE ATTACHMENTS

YOU CAN PREVENT Internet Explorer from downloading big file attachments by creating a rule that leaves e-mail attachments larger than a certain size on your Internet service provider's mail server. In Outlook Express, select *Tools•Inbox Assistant* and click *Add* to create a new rule.

In the Properties dialog box, check the *Message is greater than* box, and use the scroll bars to set a message size limit. ▶

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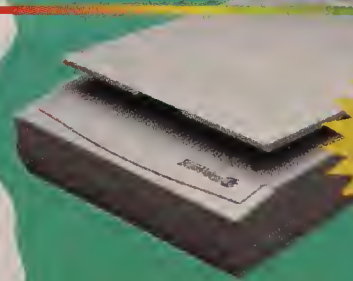

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PC WORLD

The limit will depend on whether you receive a lot of graphics files or word processing documents, and whether your pen pals are especially verbose. Otherwise, 10K is a good limit. Check the *Do not download from the server* box, then click *OK*. In the Inbox Assistant dialog box, check your rule to activate it, and click *OK*.

When someone sends you e-mail with a big attachment, just the message will arrive in your in-box. To download the attachment, you'll need to dial up your ISP. First, though, you must deactivate the rule about leaving big e-mail attachments on the ISP's server: Select *Tools•Inbox Assistant*, uncheck the rule, and click *OK*. Once you've downloaded the file (by clicking *Send* and *Receive* to retrieve mail as you normally do), you can reactivate the rule.

Unfortunately, Communicator doesn't offer a similar feature.

FILTERING SPAM

MAIL FILTERING IN Internet Explorer and Communicator lets you turn back the flood of spam. First you need to create filtering rules to delete messages whose subject and body contain words that are characteristic of spam. Here are some of them: *hot, live, one-on-one, porn, porno, calling card, ladies, babes, toll-free, toll free, cutie, girls, weight loss, lose weight, authorized, independent distributor, sugar, strippers, multi-level, dear friend, pennies, adults only, guaranteed, money, $, congratulations, free.*

Next, create a rule that deletes mail coming from known spammer addresses and domains. You'll have to type the addresses yourself. You can find a list of them at Multimedia Marketing Group's spammer site: www.mmgco.com/nospam/.

PURGE URLS FROM NAVIGATOR'S LOCATION BOX

HOW CAN I delete the URLs in Netscape Navigator's drop-down Location box? I share a PC with other students and would prefer that they didn't know which sites I visit on the Web.

Richard L. Wiringa
Madison, Wisconsin

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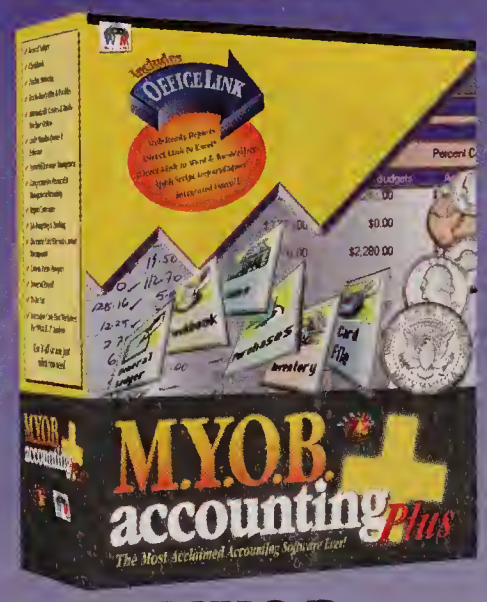

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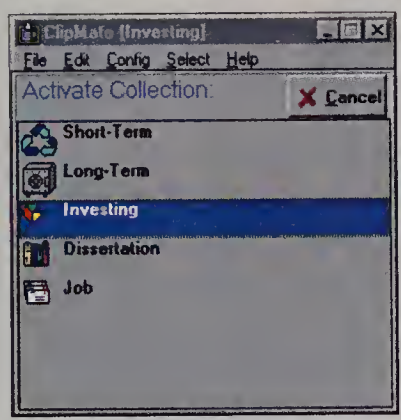
Save Clippings With ClipMate

WHILE SURFING THE WEB or chatting in a mailing list, you've probably run across nuggets of useful information. ClipMate is a handy tool for storing these gems. Just copy the information from the screen and paste it into ClipMate. Unlike Windows' Clipboard, which allows you to copy and paste only one selection at a time, ClipMate saves everything you select and lets you organize it into folders. This utility, from Thornsoft Development, is available for Windows 3.*x* and 95.



• ClipMate $25 list; Thornsoft Development; 716/227-6505; www.thornsoft.com

READER SERVICE NO. 628

Navigator 3.*x* and Windows 3.*x*. Find the netscape.ini file in the \Windows directory and open it in a text editor. In the URL History section, delete all the URLs. Save the file in text-only format.

Navigator 3.*x* and Windows 95. You'll have to edit Windows' Registry, but before you do, back up these files: system.dat, system.dao, user.dat, and user.dao. To open the Registry Editor, select *Start•Run*, type **regedit**, and click *OK*. To find a URL you'd like to hide, press **<Ctrl>-f**, type the URL into the *Find What* box, and click *Find Next*. You'll eventually arrive at a list of URLs at HKEY_CURRENT_USR\Software\Netscape\Netscape Navigator\URL History. Pick through the list on the right side of your screen (stay away from the left side!), and delete the revealing URLs.

Communicator 4.*x* and Windows 95 or 3.*x*. In Notepad, open the file prefs.js (look in Program Files\Netscape\Users\YourName, or Netscape\Users\YourName). The URL lines look something like this:

user_pref("browser.url_history.URL_1", "http://www.pcworld.com/")

Delete the ones you want to keep private, then save prefs.js as a text-only file.

To prevent the Netscape software from writing any more URLs to that file, make it read-only: In Windows 95, find prefs.js in Explorer, right-click it, select *Properties*, and check *Read-only*. Click *Apply*, then *OK*. Of course, making prefs.js read-only means that your other preferences won't be recorded. In Windows 3.*x*'s File Manager, select prefs.js, choose *File•Properties*, select *Read Only*, and then click *OK*.

To keep your browser from writing URLs into its Location box, type them into the Open Location dialog box instead (see the figure below): In Navigator 3.*x*, select

File•Open Location; in Communicator 4.*x*, select *File•Open Page*. Sites you visit will remain in the netscape.hst file, though, so be sure to delete it after each Web session.

Internet Tips *welcomes your questions and tips and pays $50 for published items. Contributing Editor Judy Heim is the author of* The Needlecrafter's Computer Companion *(No Starch Press, 1995, 800/420-7240). See page 14 for contact information.* ■

Protect Yourself in Cyberspace

DID YOU KNOW that clicking innocuous-looking voting buttons on a Web page will shuttle your e-mail address to the Web site's owner? Or that by maintaining a user profile directory, your ISP may be putting your personal data into the hands of scam artists?

The book *Web Psychos, Stalkers, and Pranksters*, by Michael Banks ($24.99, Coriolis Group Books, 1997, 800/410-0192), is full of tips on preserving your privacy in cyberspace. Among them: Get a "throwaway ID" that you use exclusively in chat sessions and newsgroups. Consider using a proxy server, like Anonymizer (www.anonymizer.com/open.html), so Web sites don't know where you're coming from. Use your mail software to disguise your address in headers. For instance, change 'john@fishburg.org' to 'john at fishburg dot org' so people will know what it is but spam robots trolling for addresses won't.

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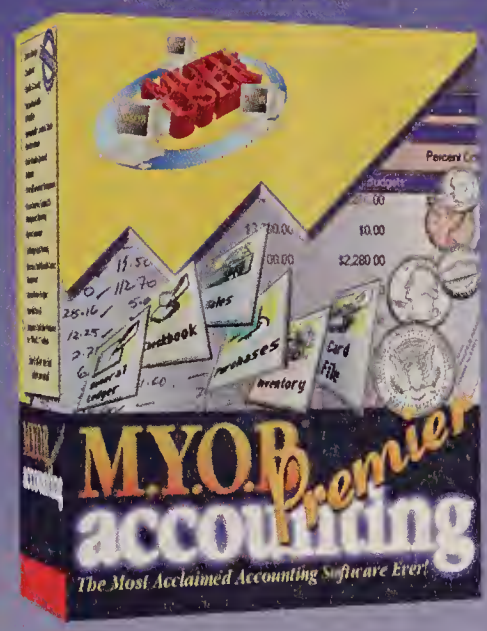

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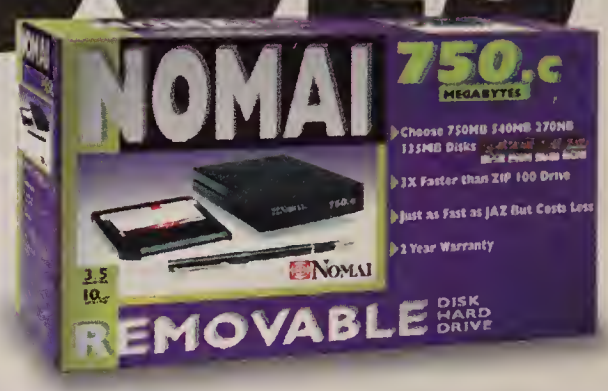

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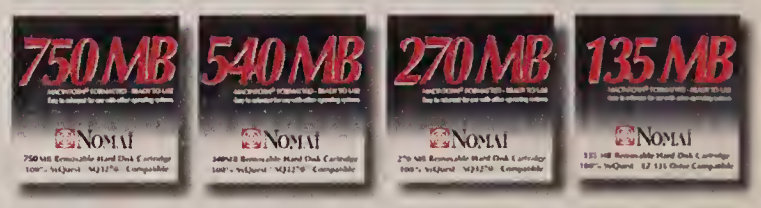

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PC MAGAZINE JULY 1997

SERVICE AND RELIABILITY SURVEY

When it comes to service and reliability, who's the one notebook vendor you can truly count on? According to the nearly 8,500 people who responded to *PC Magazine*'s 10th Annual Service and Reliability Survey,° there is only one. (Impressive considering they rated some 3,800 notebooks from 15 vendors, isn't it?) How did we earn the only "A"? Over the last year, our users reported better than average scores on four key measures: satisfaction with reliability, repair experience, and technical support; and the need for recent repairs. They also said they'd buy one again. To say the same for your notebook, visit us on the Web or give us a call.

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Keep That PC Clean!

IS YOUR IDEA of maintaining a PC simply to turn off its monitor before leaving for a long weekend? Is your keyboard starting to look like a checkerboard? Think that keeping your computer clean isn't really worth the time and trouble?

Think again.

Accumulations of dust, smoke, and grease on PC parts can lead to all kinds of problems, from poor performance to a complete system crash. Sometimes it's a slow, lingering death brought on by corroding circuits and punctuated by nagging intermittent errors that can drive you nuts. Other times it's a sudden loss of your whole system, thanks to an overheated CPU or other component. Either way, a small investment of time and money can save hours of frustration and unnecessary expense. Here's a quick guide to clean living with your PC.

SOMETHING IN THE AIR

IT SEEMS JUST about everything in the air is bad for your computer. Dust and dirt can clog ventilation ports and form insulating layers on chips. That can lead to overheating, which can damage or destroy chips—especially the hot-running CPUs in many newer PCs. And airborne particles can corrode and even fry your computer's delicate circuitry. Even worse, the damage occurs slowly, leading to intermittent errors and problems that are hard to track down.

The biggest airborne threat to your computer is cigarette smoke, which leaves a sticky film that's hard to remove.

The easiest way to keep your PC clean is by making sure the air around it is also clean. In a large office there's not much you can do. But if you work in a smaller office, you can buy a small High-Efficiency Particulate Air, or HEPA, filtration device that removes airborne particulates. Honeywell (800/554-4558) offers several models ranging from $80 to $200.

THE BROOM CLOSET

BEFORE YOU CLEAN your PC, you need the right tools. Paper towels and rubbing alcohol may work in a pinch, but to do it right, visit your local computer or electronics store. Or get your cleaning supplies from Perfect Data (800/973-7332, www.perfectdata.com). For less than $25, you can get everything you need.

Lint-free wipes, swabs, and brushes. Regular paper towels and cotton swabs can leave particulates behind. Special lint-free foam wipes and swabs are readily available and cost about $7 for 60. Some even come premoistened with an antistatic cleaning solution. A small, high-quality brush is good for dusting plastic surfaces.

Cleaning solutions. For cleaning plastics, a lint-free cloth dampened with soap and water works fine. But for cleaning electronics you'll want an alcohol-based antistatic cleaner. Garden-variety rubbing alcohol can't be trusted because it may contain impurities. Always spray or pour the cleaning solution onto the wipe or swab, never onto the object being cleaned.

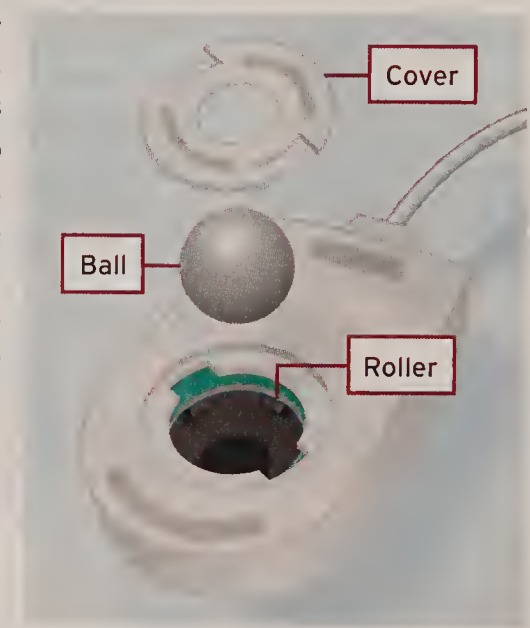

FIGURE 1: TO CLEAN YOUR MOUSE, rotate the circular cover and lift out the ball.

Compressed-gas duster. A can of compressed gas costs around $6 and is indispensable for removing dust and particulate matter from hard-to-reach nooks and crannies such as the space between keyboard keys. Get a brand that's nonflammable and doesn't use Freon or other ozone-depleting gases, and make sure it's meant for electronic equipment. Some dusters, designed for other purposes, generate static charges.

TIPS FOR GOOD HOUSEKEEPING

ROLL UP YOUR sleeves and clean up:

Motherboard and I/O cards. Clean out your system every three to six months, depending on the air quality in your location. Before digging into your PC, make sure that it's turned off and that you are grounded. Especially in dry, cold weather, your body can build up a strong electrostatic charge that can destroy delicate circuits. Always touch the PC's metal chassis before making contact with any electrical component. To be safe and make sure you're grounded, leave the computer's power supply plugged in and touch the power supply's casing.

Next, remove the PC's cover and check the ventilation ports for dust and other obstructions. Use a duster to blow loose debris off the case, power supply, and motherboard. If you have a vacuum cleaner, use it in conjunction with the duster. The goal is to *remove* the dust, not just move it around.

If your computer is in a very dusty environment, you may want to cut up an inexpensive air-conditioner filter and place it over the air intake vent on the PC's case. But remember: A smooth flow of air through the case is essential to dissipate your PC's heat, so clean the filter often.

After removing I/O cards, use the duster to blow away dust on the cards. Then clean the edge connectors with lint-free wipes and cleaning solution. Take care not to touch the edge connectors—oil from your skin can corrode their thin gold coating—or to apply a pencil eraser to them. Also take a swab to the I/O slot connectors on the motherboard.

Mouse. Cleaning your mouse regularly can extend its life significantly and often cure problems such as a sticky cursor.

Unplug the mouse and open its circular cover on the bottom by rotating it in the direction of the arrows (see **FIGURE 1**). Next,

ILLUSTRATION: ROBIN BRISKIN

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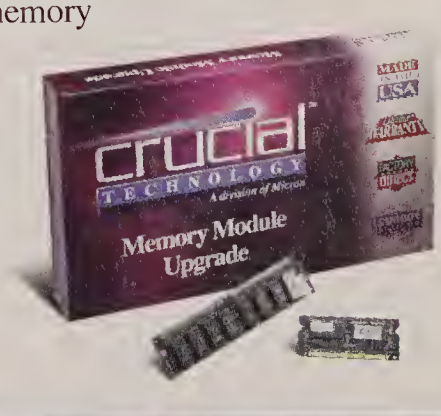

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take out the rubber ball and clean it with just soap and water—chemical cleaners can damage the ball and other mouse parts. And clean out the ball cavity with a lint-free wipe.

If your mouse jumps or won't move smoothly in one direction, there's a good chance that one of its rollers is dirty. Examine the three rollers in the ball cavity. (Two control the mouse's movement on screen—one for vertical motion and one for horizontal; the third roller just helps to hold the ball in place.) Use a swab and nonalcoholic cleaning solution to remove any dirt. If gunk is really caked on the roller, you may need to scrape it off with a toothpick. Don't let caked debris fall into the mouse. Let everything dry, then reassemble the mouse.

Keyboard. Like mice, keyboards collect oil and dirt from your hands as well as whatever might spill onto them. To do a quick cleaning, flip the keyboard upside down and use a duster with its straw attachment to clean under the keys. Wipe the keys and surfaces with a damp cloth.

For a more thorough semiannual cleaning, you can pop the keycaps off the board. On most keyboards, the caps are easily removed by gently prying up on opposite sides of the key. But before you try this, make sure you're clear about which key goes where. Also be wary of the springs under the keys; on some keyboards they pop right off when the key comes up.

Once you have all the keycaps removed, clean the board with a damp cloth or specialized cleaner. If you've got a real mess (say, from a soft-drink spill), you can be liberal with your application of cleaning solution—or even water. Just make sure the keyboard is *completely* dry before plugging it back in.

Monitor. Desktop PC displays are dust magnets, literally. They build up a strong static charge that pulls dust toward them. Wipe down the screen with a soft lint-free wipe dampened with an antistatic, alcohol-free cleaning solution.

Notebook screen. Gently use a clean, soft, lint-free cloth without cleaning solution.

Floppy drive. Cleaning kits for floppy drives come with a special cleaning-pad disk that strips the oxidation off the drive's read/write head. Unfortunately, it can also wear down the head. Unless you are already getting frequent floppy errors, wait for the first sign of trouble before cleaning. A quick blast from the duster could do the trick, too.

CD-ROM drive and discs. Cleaning a CD-ROM drive means cleaning the small lens that focuses the drive's laser beam. Cleaning kits are available with a special CD that has brushes attached to its surface. As the disc rotates, the brushes clean the lens. But before you spend $15 on a new gizmo, try directing a healthy blast of gas from your duster into the drive. Also, many drives are self-cleaning, so buying a special kit may be overkill. Check your drive's documentation.

Finally, keep your CDs free of dirt and oil. To clean the discs, moisten a clean, soft cotton cloth. Gently wipe the shiny side of the disc with strokes that start at the center and move radially outward.

TAKE THE UNIVERSAL SERIAL BUS

THE RECENT TALK about Universal Serial Bus ports implies that they will be standard on most, if not all, PCs in the near future. However, I am unclear as to what kind of connection USB uses. Does it use some kind of jack like a PS/2 device? I'm thinking of building a new computer with USB support on the motherboard. Will an old AT-style case suffice?

Justin Kuo, Lexington, Kentucky

USB IS A NEW serial port standard that will coexist with and eventually ▶

FIGURE 2: THE UNIVERSAL SERIAL BUS promises easier connections for peripherals.

PHOTOGRAPH: KEVIN CANDLAND

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1. To enter the Sweepstakes via the Internet you must be an AT&T WorldNet Service member utilizing AT&T WorldNet Service. To enter on-line visit the AT&T WorldNet Service page on the AT&T website at http://www.att.com/worldnet or at http://www.att.com/worldnet/wis/index.html or the AT&T WorldNet Service home page at http://www.att.net from 5/1/97 through 1/28/98. Over the course of the Sweepstakes there may be different methods of on-line entry which will be described on the "How to Play" page. Once you understand the directions outlined on the "How to Play" page, you may click on the "Registration Page" and complete the official entry form by filling in your name, address, telephone number and e-mail ID and a few survey questions. Once all the game requirements are completed (as described on the "How to Play" page) your name will be entered in a weekly drawing, a quarterly drawing and a Grand Prize drawing (at the end of the promotion).
Weekly Drawings: On-line entries must be received by 11:59 p.m. EST each Wednesday following the week in which you wish to be entered in order to be eligible for that week's drawing. For example, entries must be received by 11:59 p.m. EDT on Wednesday, May 7, 1997 to be eligible for the first week's drawing. On-line entries received by 11:59 p.m. EST on Wednesday, January 28, 1998 will be entered in the final weekly drawing, the final quarterly drawing and the Grand Prize drawing.
Quarterly Drawings: On-line entries must be received by 11:59 p.m. EDT on Wednesday, July 30, 1997 to be eligible for the first quarterly drawing. On-line entries must be received between 12:00 a.m. EDT on Thursday, July 31, 1997 and 11:59 p.m. EST on Wednesday, October 29, 1997 to be eligible for the second quarterly drawing. On-line entries must be received between 12:00 a.m. EST on Thursday, October 30, 1997 and 11:59 p.m. EST on Wednesday, January 28, 1998 to be eligible for the final quarterly drawing.
Grand Prize Drawing: All on-line entries received between 12:00 a.m. EDT on Thursday, May 1, 1997 and 11:59 p.m. EST on Wednesday, January 28, 1998 will be eligible for the Grand Prize drawing.
Limit one on-line entry per person per day. Normal Internet access and usage charges imposed by AT&T WorldNet Service will apply. Local, long distance or 800# access charge to reach AT&T WorldNet Service and any additional access charges or taxes that may be imposed on members or on AT&T WorldNet Service may also apply to all usage. If you are not an AT&T WorldNet Service member and wish to subscribe, visit AT&T at http://download.att.net and follow instructions to download the AT&T WorldNet Service software or call 1-800 WORLDNET to order free AT&T WorldNet Service software. If you do not wish to enter on-line, or if you are not an AT&T WorldNet Service member and you do not wish to subscribe, you may enter by mailing in a separate envelope a plain piece of paper on which you have printed your name, complete address, Zip Code, telephone number, e-mail address (if applicable) and the words "Travel the World Sweepstakes with AT&T WorldNet Service" to: TRAVEL THE WORLD SWEEPSTAKES, P.O. Box 7296, Melville, NY 11775-7296. There will be weekly drawings between 5/1/97 and 1/28/98 from among all on-line/paper entries received for each week, three quarterly drawings and one Grand Prize drawing at the end of the promotion from among all entries received. Enter as often as you wish by mail, but each paper entry must be mailed separately, be postmarked by the Wednesday following the week in which you wish to be entered and received no later than one week after the postmark date. All paper entries received will be entered in the weekly and quarterly drawings that correspond to their postmarks. Paper entries postmarked by Wednesday, July 30, 1997 and received by August 6, 1997 will be eligible for the first quarterly drawing and the Grand Prize drawing. Paper entries postmarked between July 31, 1997 and October 29, 1997 and received by November 5, 1997 will be eligible for the second quarterly drawing and the Grand Prize drawing. Paper entries postmarked between October 30, 1997 and January 28, 1998 and received by February 4, 1998 will be eligible for the final quarterly drawing and the Grand Prize drawing. Mechanically reproduced paper entries will not be accepted. Sweepstakes ends 1/28/98.
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Drawings will be conducted by National Judging Institute, Inc., an independent judging organization whose decisions are final on all matters relating to this sweepstakes. Odds of winning are dependent upon the number of entries received. Limit one weekly prize per person per week. All prizes will be awarded and winners will be notified by e-mail or regular mail. In the event the Grand Prize or any Quarterly Prize is won by a minor, it will be awarded in the name of a parent or legal guardian. Prizes are non-transferable and no substitutions are allowed except by sponsor who reserve the right to substitute a prize of equal or greater value if advertised prize is unavailable. By entering the sweepstakes, each participant releases the Sponsor and its agents from all responsibility or liability for damages, losses or injury resulting from acceptance or use of any prize. 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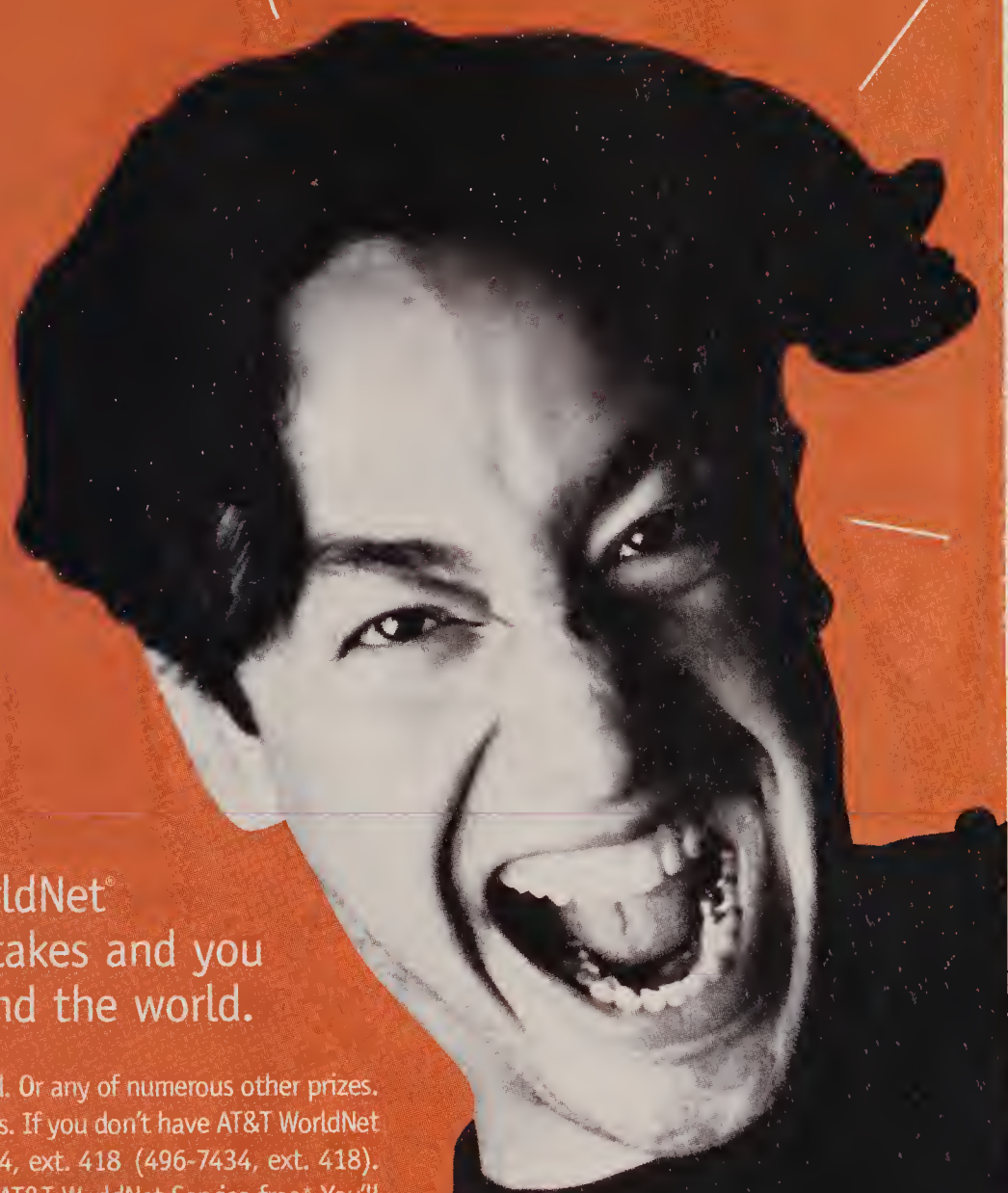

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replace the old RS-232 serial port that connects your mouse and keyboard to your computer. Just about every new PC supports USB both in hardware, with chips on the motherboard, and in software, with OEM Service Release 2.1 of Windows 95 (and the upcoming Windows 98). USB peripherals can be daisy-chained (plugged into each other) for easy access.

A first wave of USB peripherals—including mice, keyboards, scanners, and monitors—should be available now, though vendors are still working out bugs.

The USB connector is a small, rectangular plug with no prongs to bend that slips into its own slot on the back of the PC (see **FIGURE 2**). If you want to build a new PC with USB support, you must either buy a motherboard that's already equipped with a USB chip set and connector, or buy a USB add-on card and plug it into an expansion slot on a non-USB motherboard. By the time you read this, CMD Technology (800/426-3832) should be offering a retail version of its PCI-based USB add-in board for $59. It comes with drivers for all versions of Windows 95. If you buy a USB-equipped motherboard, it will probably have the new ATX form factor, so your old AT-style case may not fit.

CUSTOMIZED KEYBOARDS

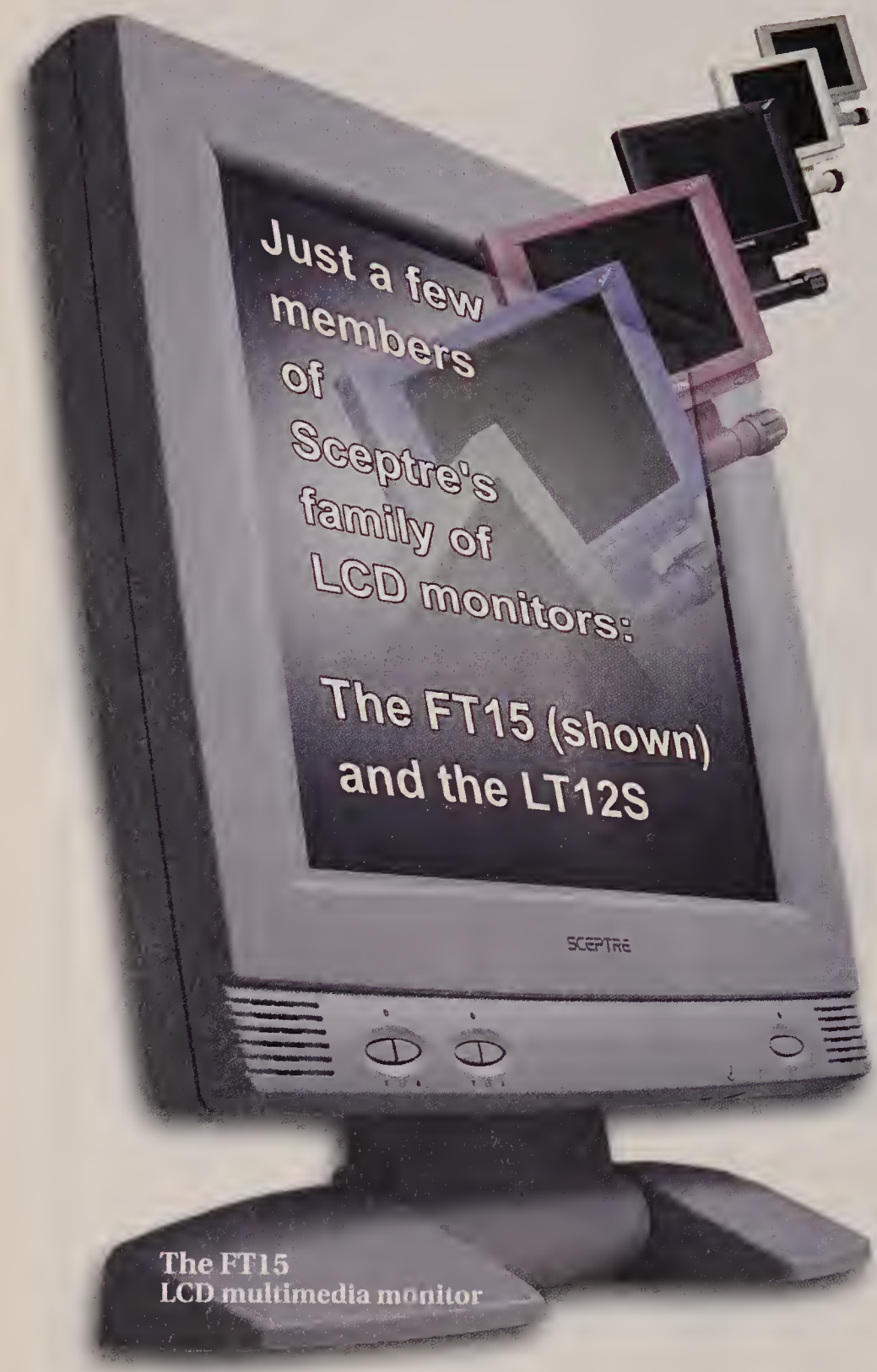
I JUST BOUGHT a new Windows 95 PC. My problem is that I'm accustomed to using the Dvorak keyboard layout. Will this work in Windows 95? And if so, how do I set it up?

Jeff Brine, Seattle

WINDOWS 95 supports a number of keyboard layouts, including the Dvorak design—an ergonomically less-demanding alternative to the standard Qwerty layout. To change the layout setting, launch the *Keyboard* applet in Windows' Control Panel, select the *Languages* tab (Windows 95 also supports several foreign languages), and click on *Properties*. You'll see a drop-down menu that lets you select the keyboard layout of your choice.

Kirk Steers is a PC World *contributing editor. Hardware Tips welcomes your questions and pays $50 for published items. See page 14 for contact information.* ■

Been There, Done That!



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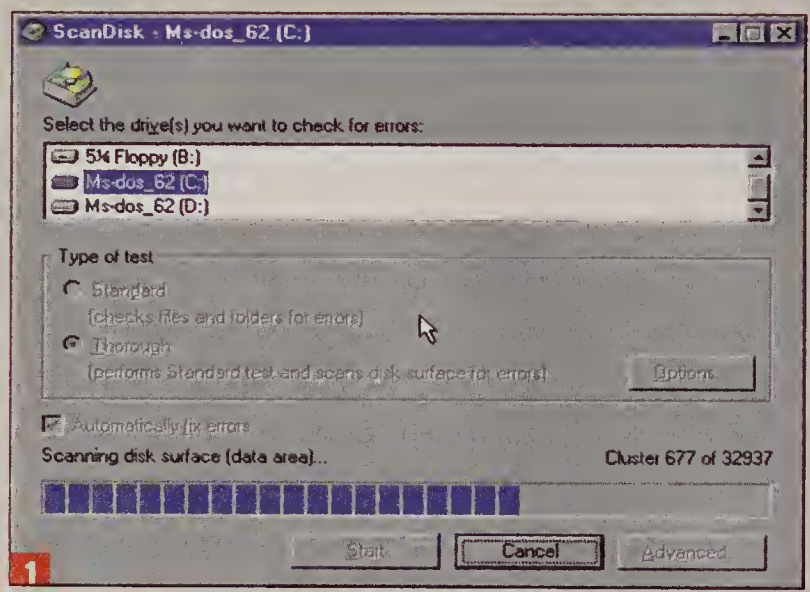
Install a Second EIDE Hard Drive

WORK EXPANDS to fill the time you give it, and your software and data expand to fill any hard drive you give yourself. So it's not surprising that installing a new hard drive is one of the most common upgrades—especially since prices continue to drop dramatically.

Today, the low end of the drive universe is a 1.6GB model, available for about $180. But if you're going to increase your drive real estate, consider opting for the biggest drive you can afford. The current sweet spot of the drive market is 2.1GB at about $210, while 3.1GB drives average $230, 4.1GB models can be had for $300, 5.1GB drives cost about $385, and the current whopper, 6.4GB, runs some $400.

These prices are for EIDE drives, the most common type in today's PCs. SCSI drives offer better performance for some applications but are also much more expensive, starting at about $250 for 2GB and $370 for 4GB. Ultrahigh-performance SCSI drives that spin at higher speeds can be double the price. And you'll also need a SCSI add-in controller card, which is another $150 to $300.

If your PC is more than two years old and your existing hard drive smaller than 512MB, your BIOS may not be able to handle today's large drives. Check your



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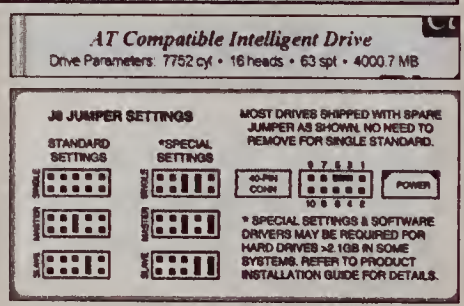


Get prepared. To make sure your existing drive contains no errors, run ScanDisk (*Start•Programs•Accessories•System Tools•ScanDisk*) and defragment your drive (*Start•Programs•Accessories•System Tools•Disk Defragmenter*). Then do a full backup of your existing hard drive.

Create a bootable DOS floppy disk—you'll need it to boot your system and access the new drive. To create it, put a blank floppy disk into your drive. Double-click on the *My Computer* icon; select the drive, and then *File•Format*. In the resulting dialog box, pick *Full* format and make sure to click the *Copy system files* box.

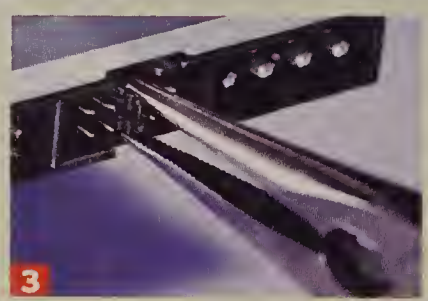
Before you start the drive installation, make sure you have the drive parameters (number of cylinders, sectors, and so on) for both the new and the old drives. If this information is not printed on the drives, you'll find it in the drive manual or on the manufacturer's Web site.

Remove the old drive if necessary. Turn off your PC, remove the cover, and disconnect the wide ribbon cable and power cable from your existing hard drive. Carefully note how the red wire on the ribbon cable meets the drive connector. Make sure there's a second connector on the ribbon cable and a free power connector; if not, you'll need to buy another ribbon cable and a Y-adapter that makes two power connectors out of one.

If you plan to use your old drive as a second drive in your PC, you may not need to remove it. You will, however, need to have access to the drive's jumpers, and a place to mount your new drive so that both drives can be connected to the same ribbon cable.

If you need to remove the drive from the PC, this may be a simple matter of sliding it out, or you first may have to remove several screws. If the drive is on a slide-out bracket, remove the screws that hold the bracket. Place the drive carefully on a flat surface. Unpack your new drive and place it next to the old drive.

2


3

Set the drive jumpers. EIDE drives are designated as master or slave. The old drive you just removed is a master, but if you plan to keep using it, you must change it to a slave using the jumpers on the drive. If you're lucky, a chart showing the correct jumper positions will be printed on the drive. If there's no such chart, you will need to pull out your original drive manual or go to the manufacturer's Web site.

Make sure your new drive is set as master. Note that some drives have a simple jumper setting for master, but others have different settings depending on whether the installation involves two drives.

PHOTOGRAPHS: KEVIN CANDLAND

system manual (which may or may not be of help). You can, however, still install a new drive by using software such as Disk Manager from Ontrack (www.ontrack.com) or DrivePro from Micro House (www.microhouse.com).

The Big Five makers of hard drives are IBM (www.ibm.com), Maxtor (www.maxtor.com), Quantum (www.quantum.com), Seagate (www.seagate.com), and Western Digital (www.wdc.com). All hard drives today are vastly more reliable than they were a few years ago; the vendors say the average drive will outlast the average *PC World* reader. All major drive manufacturers offer multiyear warranties and no-questions-asked replacements.

Although the mechanics of installing a new hard drive aren't difficult, getting the operating system and then any applications and files from your original drive to the new one has been a thorny problem. (You'll probably want to keep your old drive, but for best performance, the new drive should be your primary resource.)

Sure, you do a full backup before you begin, but it's a hassle to restore—you need to reinstall Windows before you can reinstall the software to restore the backup. And although you can use the MS-DOS xcopy command, with an /h switch that copies system and hidden files, remember that xcopy doesn't handle Windows 95 long file names.

We've received a steady stream of complaints about problems in moving files manually between drives, and we now recommend you buy a utility that simplifies the final stages of installing your new hard drive, such as the $30 DriveCopy from PowerQuest (www.powerquest.com, 800/379-2566). If, instead, you want to tackle this task on your own, check out last March's *Answer Line* for instructions.

Here's how to install your new hard drive. Before you start, read all the way through to make sure you've got everything you need.

Stan Miastkowski is a PC World *contributing editor.* ■

4

Connect data and power cables. Mount your new drive. You may need an adapter kit and a pair of drive rails to allow a 3.5-inch hard drive to fit into a 5.25-inch bay.

If you'll be using the second drive, but you needed to remove it in Step 2, put it back now. Then connect the original ribbon cable and power connector to the new drive.

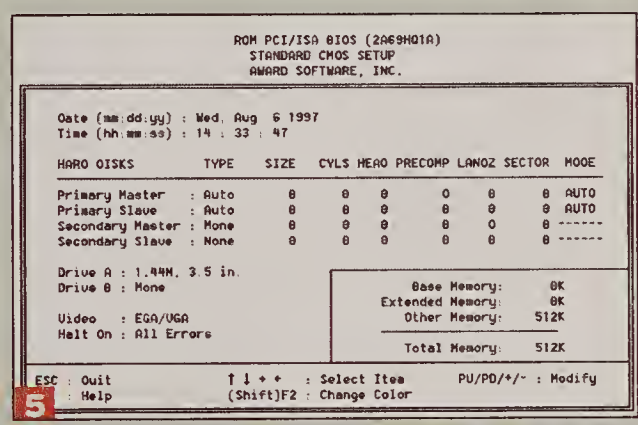
Even if you won't be using your old drive in your PC, you'll still need to connect it temporarily in order to copy files. Lay it carefully in a location where cables can reach it, but make sure that it doesn't contact the metal case.

Whether it's back in the PC or outside, connect up the old drive: plug in a second connector on the ribbon cable, and then a power connector.

Copy from the old drive to the new. Start your PC using the bootable DOS floppy disk you created in Step 1. During the boot process, run your PC's setup program and set your BIOS for drives 1 and 2 to Auto, which should automatically detect the two drives. If your setup doesn't have an Auto option, you'll need to manually enter the parameters that you gathered in Step 1.

Save the setup settings and reboot using the floppy disk.

Insert the floppy disk with the disk copy program and run it. Follow the directions that appear on the screen. Do an errand or make coffee—the copy process will take a while.



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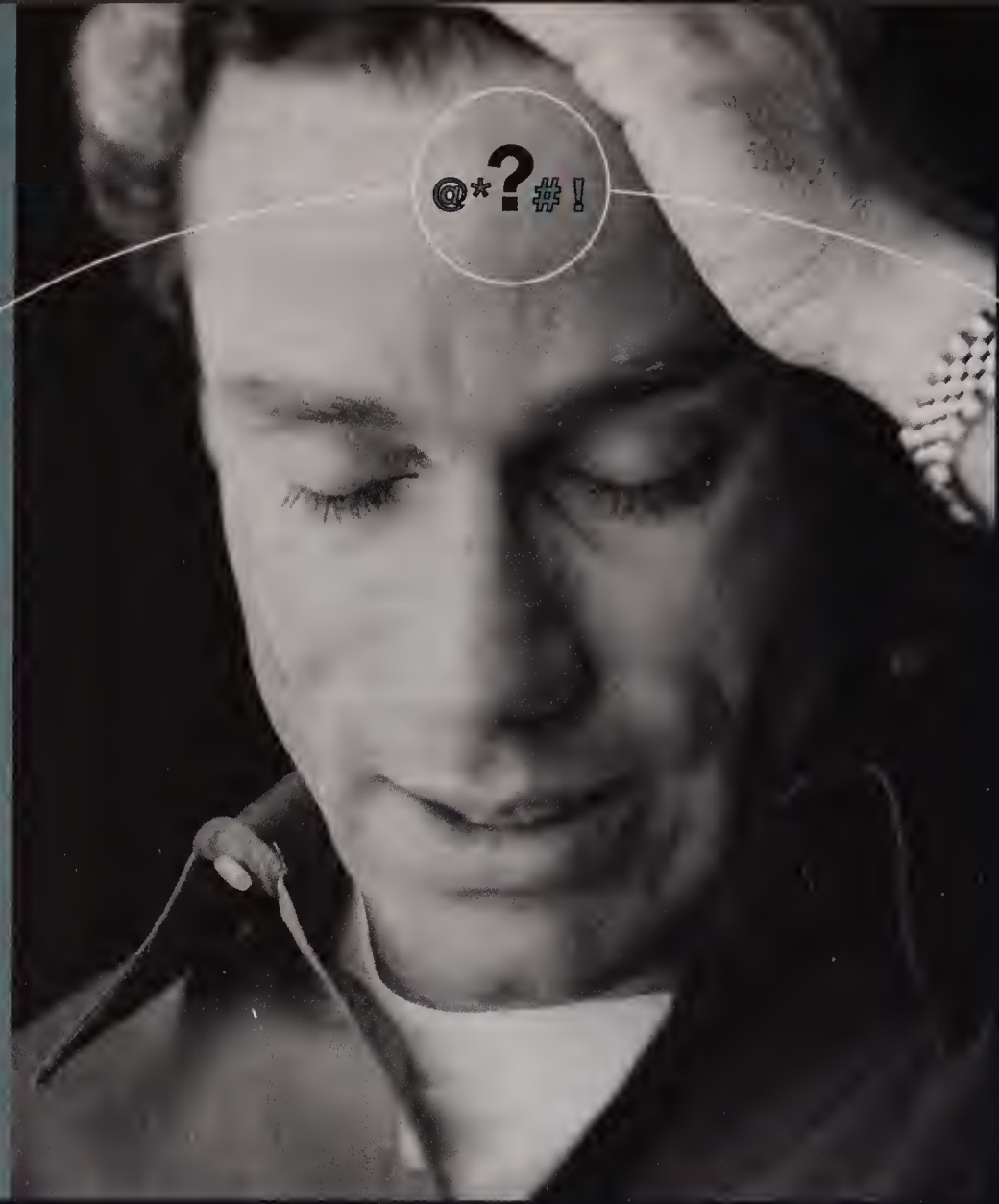
Finish up. When the disk copy software is finished, remove the floppy disk and restart your PC. It should boot up in the normal way. When you're sure everything's working correctly, turn off your PC, disconnect and remove your old drive if you won't be using it, and put the cover back on your PC.

If you're using your old drive as the second (D:) drive, it's a good idea to format it—cleaning it up to receive new data—instead of just erasing files, unless you want to save selected files as a backup. To format it, double-click on the *My Computer* icon, select the drive, and then select *File•Format*.

If you're ditching your old drive and your setup doesn't auto-detect drives, enter the setup and set Drive 2 to *None*. Otherwise, you'll get an error message when you start up. There's no need to change the BIOS if your PC auto-detects drives.



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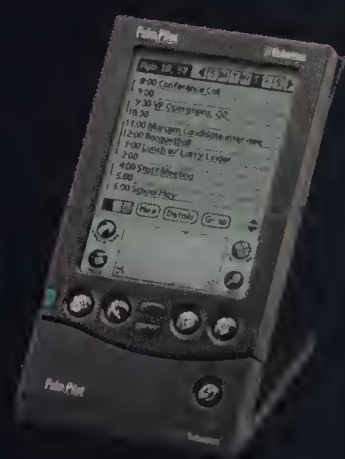

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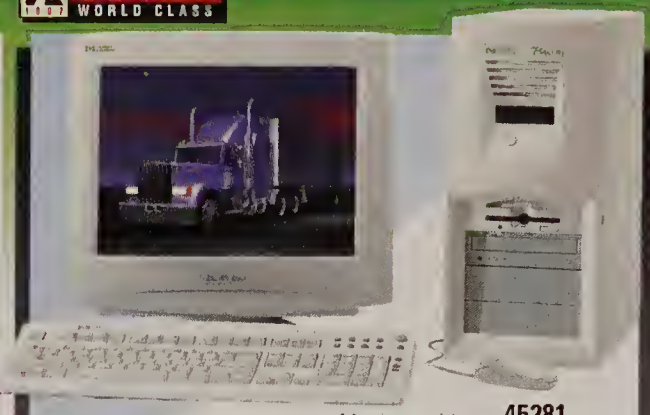

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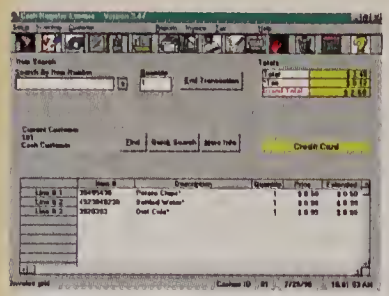

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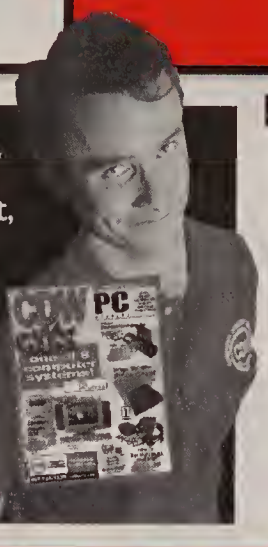

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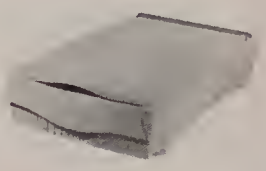

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#96040	560E	150MHz MMX	16MB	2.1GB	11.3" DSTN	4.1	$2,099	$84
#90515	560	133MHz	8MB	2.1GB	12.1" TFT	4.1	$2,399	$56
#96041	560E	166MHz MMX	16MB	2.1GB	12.1" CSTN	4.1	$3,699	$148

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Order#	Model	Pentium® Processor	RAM	HD	CD	Display	Wt (lb.)	Price	or Lease /Month
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#99917	380E	150MHz w/MMX*	16MB	2.1GB	–	12.1" FRSTN	6.7	$1,899	$76
#99913	380ED	166MHz w/MMX*	16MB	2.1GB	20XCD	12.1" FRSTN	7.0	$2,399	$96
#94278	380D	150MHz w/MMX*	16MB	2.1GB	8X	12.1" TFT	6.9	$2,699	$108
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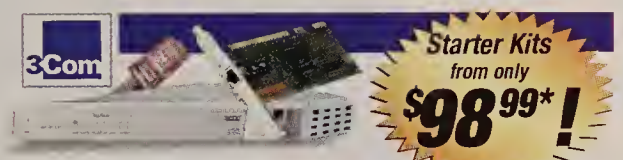

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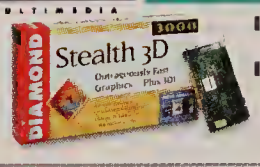

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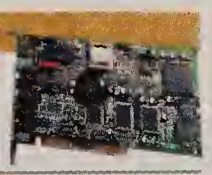

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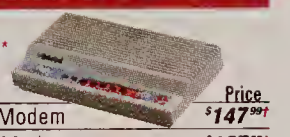

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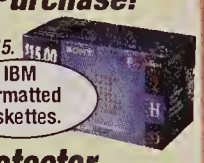

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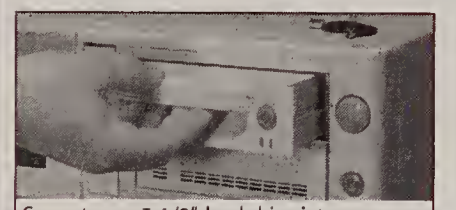

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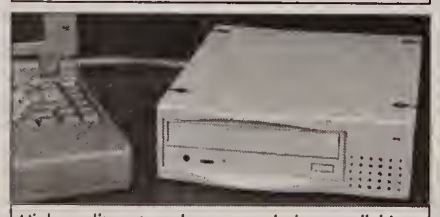

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1281MB	5200	Western Digital	AC11200	$152
1624MB	5200	Western Digital	AC21600	$158
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2557MB	4500	Seagate	ST32531A	$174
2559MB	5200	Western Digital	AC22500	$195
3000MB	4500	JTS	JTS3000	$199
3166MB	5200	Western Digital	AC33100	$208
4000MB	5200	Western Digital	AC34000	$243
4000MB	**5200**	**Micropolis**	**MC4540A**	**$224**
4320MB	3600	Quantum	BF4335A	$211
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SCSI	***RPM***	***Brand***	***Model***	***Price***
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2151MB	5400	Quantum	FB32160S	$219
2160MB	7200	Seagate	ST32272N	$369
2275MB	7200	Quantum	VK32275S	$335
3228MB	5400	Quantum	FB33240S	$290
4300MB	5400	Micropolis	MC4743	$319
4310MB	5400	Quantum	FB34320S	$319
4400MB	7200	Fujitsu	M2954S	$539
4550MB	7200	Micropolis	MC4345	$515
4550MB	7200	Micropolis	MC4345AV	$569
4550MB	7200	Seagate	ST34572N	$577
4550MB	7200	Quantum	VK34550S	$505
4550MB	7200	Quantum	XP34550S	$608
4550MB	10,000	Seagate	ST34501N	$665
6448MB	5400	Quantum	FB36480S	$437
9100MB	**7200**	**Micropolis**	**MC3391**	**$855**
9100MB	7200	Fujitsu	M2949S	$889
9100MB	7200	Quantum	XP39100S	$913
9100MB	7200	Micropolis	MC3391AV	$919
9100MB	7200	Seagate	ST19171N	$935
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2275MB	7200	Quantum	VK32275W	$335
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4300MB	**5400**	**Micropolis**	**MC4743W**	**$329**
4400MB	7200	Fujitsu	M2954W	$550
4550MB	7200	Micropolis	MC4345W	$535
4550MB	7200	Micropolis	MC4345WAV	$589
4550MB	7200	Seagate	ST34572W	$615
4550MB	7200	Quantum	VK34550W	$505
4550MB	7200	Quantum	XP34550W	$608
4550MB	10,000	Seagate	ST34501W	$699
9091MB	**5400**	**Micropolis**	**MC3391W**	**$875**
9091MB	5400	Micropolis	MC3391WAV	$935
9100MB	7200	Fujitsu	M2949W	$962
9100MB	7200	Quantum	XP39100W	$913
9100MB	7200	Seagate	ST19171W	$959
9100MB	10,000	Seagate	ST19101W	$1100
23300MB	5400	Seagate	ST423451W	$1859

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UWD	***RPM***	***Brand***	***Model***	***Price***
2160MB	7200	Seagate	ST32272WD	$455
4550MB	7200	Seagate	ST34572WD	$652
4550MB	10,000	Seagate	ST34501WD	$759
9100MB	7200	Seagate	ST19171WD	$1029
23200MB	5400	Seagate	ST423451WD	$189
SCA	***RPM***	***Brand***	***Model***	***Price***
2160MB	7200	Seagate	ST32272WC	$419
4550MB	7200	Seagate	ST34572WC	$629
4550MB	10,000	Seagate	ST34501WC	$719
9100MB	7200	Seagate	ST19171WC	$989
9100MB	10,000	Seagate	ST19101WC	$1120
FC-AL	***RPM***	***Brand***	***Model***	***Price***
4550MB	10,000	Seagate	ST34501FC	$759
9100MB	7200	Seagate	ST19171FC	$1020
9100MB	10,000	Seagate	ST19101FC	$1179

DRIVE COOLER !

Hard Drive Cooling Fan Mounts in a 5 1/4 half height drive bay. Compatible with any 3 1/2" hard drive. Built in circuitry speeds up fans as drive gets warmer. A must for 7200 and 10,000 RPM drives. (VHDFAN) $30

CD ROM DRIVES

IDE CD ROM

Speed	Brand	Model	ms	Int
16X	Mitsumi	CRMCFX16X	120	$89
16X	NEC	CDR1600	100	$89
24X	Teac	CD524E	95	$92
24X	Panasonic	CR585	85	$94
24X	Pioneer	DRX24X	75	$95
24X	Mitsumi	CRMCFX24X	90	$96
24X	Toshiba	XM6102B	85	$99
32X	Teac	CD532E	84	$115

IDE CD CHANGERS

Speed	Brand	Model	# Disks	Int
6X	NEC	CDR4X6	4	$79
8X	NEC	CDR4X8	4	$105
12X	Panasonic	SQTC512N	5	$266

ACCESSORIES

Buy a CD drive & sound card & get a FREE audio cable.
Creative Labs Sound Blaster 16 Value PnP (SBIDE) $69
Creative Labs Sound Blaster AWE64 (SB64AWE) $100
Creative Labs Sound Blaster AWE64 (SB64AWEGOLD) $180
Professional speakers with Bose style swivel speakers and separate subwoofer.
25 Watt (SPEAKERJR) $99 35 Watt (SPEAKERPRO) $129
Universal sound cable(AUDIOMIX) $9
Turn any IDE CD ROM into an external for parallel printer port (PPCASECD) $89
Turn any IDE CD ROM into an external for PCMCIA port (PCMCIACASECD) $189

SCSI CD ROM

Speed	Brand	Model	ms	Int
12X	Plextor	PX12TS(tray)	105	$197
12X	Plextor	PX12CS(caddy)	105	$259
15X	Toshiba	XM38018	99	$145
16X	NEC	CDR1610	100	$135
20X	Plextor	PX20TS	95	$219
24X	NEC	CDR1B10	85	$155
32X	Teac	CD532S	85	$169
32X	Plextor	tray or caddy	85	$Call

SCSI CD CHANGERS

Speed	Brand	Model	# Disks	
16X	Nakamichi	MJS16	5	$239

SCSI CD TOWERS

			4 Drive	7 Drive
15X	Toshiba	99ms	$819	$1439
16X	NEC	100ms	$859	$1499
20X	Plextor	95ms	$1259	$2219

SCSI CD TOWERS w/ 5 Disc Changers
Nakamichi 16X 150ms $1399 $2399
Ethernet adapter option available. Call.

CD RECORDERS

Sony 2x6
Internal SCSI drive (CDU926S) $309*
External SCSI drive (CDU926SX) $399

Yamaha 4x6
Internal SCSI drive tray load (YCDR400T) $479*
Internal SCSI drive caddy load (YCDR400) $489*

Ricoh 2x6 CD ReWritable
Internal SCSI drive 1MB, tray load (RO6200S) $419*
Internal SCSI drive 2MB, caddy load (RO6201S) $469*

Hewlett Packard SureStor 7110
SureStor 7110 includes 1 disk
Internal SCSI (C4365A) $419
External for parallel printer port (C4366A) $519

Sony 2x8
Internal IDE (CDU928S) $349*
Kit w/ 1 disk, and software compatible with Win 95 & Win NT 3.51 & up. Req IDE controller. (CDU928SKIT) $369

Mitsumi 2x6
IDE Kit includes 3 disks, and software compatible with Win 95 & Win NT 3.51 and up. Requires IDE controller.
Internal (CRMC2600TE) $415
*Drive must be purchased with COR software or media.

ULTRA IDE HARD DRIVES

FUJITSU					
1750MB	10ms	5400	MP3017U	3	$152
2620MB	10ms	5400	MP3026U	3	$178
3500MB	10ms	5400	MP3035U	3	$198
4370MB	10ms	5400	MP3043U	3	$258
5250MB	10ms	5400	MP3052U	3	$309
QUANTUM					
1614MB	10ms	5400	FB31620A	3	$147
2151MB	10ms	5400	FB32160A	3	$181
3228MB	10ms	5400	FB33240A	3	$212
4310MB	10ms	5400	FB34320A	3	$249
6448MB	10ms	5400	FB36480A	3	$346
MAXTOR					
3240MB	10ms	5200	M83240D	3	$198
4320MB	10ms	5200	M84320D	3	$242
6480MB	10ms	5200	M86480D	3	$364
7000MB	10ms	5200	M87000D	3	$364
8400MB	10ms	5200	M88400D	3	$427
SEAGATE					
2111MB	12ms	4500	ST32122A	3	$177
3227MB	12ms	4500	ST33232A	3	$199
4303MB	12ms	4500	ST34342A	3	$250
6450MB	9.5ms	5400	ST36451A	3	$349
WESTERN DIGITAL					
4304MB	11ms	5400	AC34300	3	$288
5160MB	12ms	5400	AC35100	3	$345
6400MB	9.5ms	5400	AC36400	3	$389

Promise PCI Ultra IDE Controller (ULTRA33) with drive ***$50***

TAPE DRIVES

EXABYTE

3.5-7Gig	8mm, 32MB/min, EXB8205XL	$1189
7-14Gig	8mm, 120MB/min, ELIANT820	$1499
7-14Gig	8mm, 60MB/min, EXB8700LT	$679
7-14Gig	8mm, 60MB/min, EXB8700	$919
(EXB8700 includes: 1 tape, 1 cleaning tape, and backup software)		
20-40Gig	8mm, 360MB/min, EXB8900	$3679
70-140Gig	8mm, 60MB/min, EXB10H	$4239

HEWLETT PACKARD

2Gig	DAT, 11MB/min, C1534AI	$579
2-4Gig	DAT-DC, 42MB/min, C1536AI	$609
4-8Gig	DDS-2 DAT, 60MB/min, C1599AI	$819
12-24Gig	DDS-3 DAT, 120MB/min, C1554AI	$1119
72-144GB	DDS-3 DAT, 120MB/min, C5648A	$2699

SEAGATE

2-4Gig	DAT-DC, 66MB/min, STD24000N	$589
4Gig	Mini, 29MB/min, TSTB000	$339
4-8Gig	DDS-2 DAT, 66MB/min, STD28000N	$795
12-24Gig	DDS-3 DAT, 132MB/min, STD224000N	$1059

SEAGATE MINI CART
Prices include Dos/Win backup software & 1 tape
3.2Gig TR3, TST3200 $179 Parallel ver $189
8Gig TR4, STT28000A IDE/SCSI $289/$339

SONY **$20 rebate w/ hard drive purchase**

4-8Gig	DDS-2 DAT, 44MB/min, SDT5000AI	$695
4-8Gig	DDS-2 DAT, 90MB/min, SDT7000AI	$759
12-24Gig	DDS-3 DAT, 144MB/min, SDT9000AI	$1039
32-64Gig	DDS-2 DAT, 90MB/min, TSL7000X	$2099

QUANTUM

15-30Gig	DLT, 150MB/min, DLT2000XT	$2499
20-40Gig	DLT, 180MB/min, DLT4000	$3249
75-150Gig	DLT loader, 150MB/min, DLT2500XT	$4779
100-200Gig	DLT loader, 180MB/min, DLT4500	$6219
105-210Gig	DLT loader, 150MB/min, DLT2700XT	$6539
140-280Gig	DLT loader, 180MB/min, DLT4700	$8109

REMOVABLE DRIVES

IOMEGA 100MB ZIP

Internal SCSI for PC (ZIP100I)	$145
Internal IDE for PC (ZIP100A)	$115
External SCSI for PC or Mac (ZIP100)	$145
External for PC parallel port (PPZIP100)	$145
100MB disks (ZIP100C) Qty 2-9/Qty 10+	$18/$14

IOMEGA 1Gig JAZ

Internal SCSI with 1 disk (JAZI)	$285
External SCSI in our case with 1 disk (JAZEX)	$348
External SCSI in Iomega case with 1 disk (JAZX)	$388
Disks Qty 2-4/5-9/10+ 1Gig	$87/$85/$82

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SYQUEST 230MB Flyer

Ext. SCSI (EZ230S)	$146
Ext Parallel(EZ230PP)	$146
Extra Disks Qty 2-4/5-9/10+	$28/$26/$24

SYQUEST 1.5GB SyJet

Int. SCSI (SYJET1.5PCI)	$288
Ext SCSI (SYJET1.5PCX)	$383
Extra Disks Qty 2-4/5-9/10+	$86/$84/$82

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FUJITSU Call about 5 Free Disks w/640MB Drives!
230MB •128MB compatible, 30ms, 3600rpm
Internal IDE w/ 1 free disk (M2541AC) $299
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Internal SCSI w/ 1 free disk (M2513A2WC) $419

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230MB	[TJ230]	$15	$13	$11
540MB 3 1/2"	[TJ540]	$28	$26	$22
640MB 3 1/2"	[TJ640]	$30	$28	$26
1.2GB 512K	[TJ1.2]	$33	$31	$29
1.3GB 1024K	[TJ1.3]	$33	$31	$29
2.3GB 512K	[TJ2.3]	$45	$43	$41
2.6GB 1024K	[TJ2.6]	$45	$43	$41

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Adaptec AHA-2742 SCSI-2 EISA w/Flop Kit 279
Adaptec AHA-2940UW PCI SCSI-3 Master Kit 281

DRIVES

CD-ROM / CD-RECORDABLE DRIVES

Goldstar 24X 99
Microsolutions 8X Parallel Port 209
Panasonic KXL-783A PCMCIA Kit w/sound 369
Plextor 20-12Plex SCSI ext/int 189/279
CD-R - Pinnacle Micro RCD226 4x4 int./ext. 659/739
CD-R - Plextor Plexwriter 2x4 int/ext 466/579
CD-R - Smart&Friend. 6X-2X Rec. int./ext. 349/439
CD-R - Smart&Friend. 6-4-2X Rec."Rewritable"int. 679

REMOVABLE DRIVES

IOMega Ditto 2.0G int / Ditto 3.2G int 129/169
IOMega Zip / JAZ 1.0G int 139/279
Pinnacle Micro Apex Optical 4.6G 1239
Syquest EZ-Flyer 230 Par/ Syjet 1.5G int. 189/359
Seagate 4mm DAT 8.0G int./ext. 849/949
Seagate Tapestor 3.2G ext. par/4G ext.SCSI. 189/439
Sony Stor Station 2.0G w/Navigator Software 129
Sony Nice 5200 int./ext. 689/799

HARD DRIVES

Micropolis 5.0GB Ultra 359
Quantum Fireball 2.1G FATA/TM 3200 3.2G 169/219
Maxtor EIDE 3.2G 229
Seagate Medalist 3.2GB SCSI-2 219
Western Digital Caviar AC22100 2.5G/5.1G .219/365

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Sportster Voice x2 56K int./ext 169*/189*
Sportster x2 56K Faxmodem int./ext. 149*/169*

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EIZO BY NANAO

FX-B5	15"	1280x1024	.28mm	529
FX-C5	17"	1280x1024	.28mm	759
FX-C6	17"	1600x1200	.26mm	839
TX-C7	17"	1600x1200	.25mm	879
FX-E7	21"	1280x1024	.28mm	1749
FX-E8	21"	1600x1200	.26mm	2299

HITACHI

Pro 500	15"	1280x1024	.28mm	319
Elite 630	17"	1600x1280	.22mm	679
Elite 751	19"	1600x1200	.22mm	1069
Pro 800	21"	1600x1200	.22mm	1419

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7BM749	14"	720X400	Monochrome	109
CM2089	14"	1024x768	.28mm	199
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MB7000	17"	1280x1024	.24mm	479
CM5600	20"	1600x1280	.28mm	989

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SONY

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CPD-100SF	15"	1280x1024	.25mm (digital)	339
CPD-100VS	15"	1280x1024	.25mm w/speakers	459
CPD-200SX	17"	1280x1024	.25mm	585
CPD-200SF	17"	1280x1024	.25mm (digital)	649
CPD-220VS	17"	1280x1024	.25mm w/speakers	739
GDM-17SE2T	17"	1600x1200	.25mm	819
CPD300SFT	20"	1280x1024	.30mm	1349
CPD-20SF2	20"	1600x1200	.30mm	1569
GDM-20SE2T	20"	1600x1200	.25mm	1789

VIEWSONIC

V655 OPTI	15"	1280x1024	.28mm	269
V773 OPTI	17"	1280x1024	.26mm	499
O100 OPTI	21"	1600x1280	.28mm	999
15GS	15"	1280x1024	.28mm	309
17PS	17"	1600x1280	.25mm	649
G810	21"	1600x1200	.25mm	1239

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MT-9017E	17"	1600x1280	.25mm	649
MT-9021E	21"	1600x1280	.30mm	1399
MT-9221	21"	1800x1440	.28mm	1529

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LaserJet 6LXi	6ppm	600dpi	1MB		379
LaserJet 6PXi	8ppm	600dpi	2MB		729
LaserJet 6MP	8ppm	600dpi	3MB	postscript	879
LaserJet 4V	16ppm	600dpi	4MB	11x17	1753
LaserJet 4MV	16ppm	600dpi	12MB	11x17,PS	2539
LaserJet 5	12ppm	600dpi	4MB		999
LaserJet 5N	12ppm	600dpi	4MB	ethernet	1299
LaserJet 5M	12ppm	600dpi	6MB	postscript	1529
LaserJet 5SI	24ppm	600dpi	4MB	network	2349
LaserJet 5SINX	24ppm	600dpi	4MB	ethernet	2649
LaserJet 5SIMX	24ppm	600dpi	12MB	e-net PS	3399
LJ 5 Color	10ppm	300dpi	20MB	color	3799
LJ 5M Color	10ppm	300dpi	36MB	color, PS	4849
LJ 5SIMopier	24ppm	600dpi	12MB	duplex	6699
LaserJet 4000	17ppm	1200dpi	4MB	postscript	NEW
LaserJet 4000T	17ppm	1200dpi	4MB	3-tray	NEW
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Optra N240	24ppm	600dpi	4MB	11x17	2699
Optra N245	24ppm	600dpi	16MB	11x17	3199
Optra RT+	16ppm	1200dpi	4MB		1249
Optra S1250	12ppm	1200dpi	4MB		999
Optra S1650	16ppm	1200dpi	4MB		1269
Optra S1250N	12ppm	1200dpi	4MB		1299
Optra S1650N	16ppm	1200dpi	4MB		1549
Optra S2450	24ppm	1200dpi	4MB		2189
Optra S2450N	24ppm	1200dpi	12MB		2549
Optra SC1275	12ppm	600dpi	16MB	Color	3839
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Turbo 184/320/321/520/521	25/315/442/379/489
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QMS

Magicolor CX	12ppm	600dpi	20MB	Color	4999

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HEWLETT PACKARD

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Astra 1200S 600x1200dpi w/Photodeluxe 356
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PowerLook II PS w/Photoshop Full 1299

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ATI All-in-Wonder (TV Tuner, Video Capture, TV set display) .199
Diamond Stealth 3D 2200XL / Monster 3D ...79/179
Intel SmartVideo III 172
Matrox Millennium II PCI 4M/8M/12M ...189/Call/Call
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COMPUTERS

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Presario 2200	P166	16M	1.6G	8X	33.6K		819
Presario 4505	P166MMX	16M	2.1G	16X	33.6K		1019
Presario 4508	P200MMX	24M	3.2G	16X	33.6K		1539
Presario 4528	P233MMX	32M	3.2G	24X	33.6K		1819
Presario 4840	Pent II-266	32M	6.5G	DVD	56K		2579
Presario 4850	Pent II-300	32M	6.5G	DVD	56K		2869

SONY

Vaio PCV-120	P200MMX	32M	3.8G	16X	33.6		1749
Vaio PCV-130	P200MMX	32M	4.3G	24X	56K	Zip	1949
Vaio PCV-200	Pent II-233	32M	4.3G	24X	56K	Zip	2279
Vaio PCV-220	Pent II-266	32M	6.4G	24X	56K	Zip	2569
Vaio PCV-240	Pent II-300	32M	6.4G	24X	56K	Zip	3149

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COMPAQ

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Deskpro 2000	P166MMX	32M	3.2G	16X	3 HD Bays	1399
Deskpro 2000	Pent II-233	32M	3.2G	24X	Matrox 4MB	1989
Deskpro 2000	Pent II-266	32M	3.2G	24X	Matrox 4MB	2199
Deskpro 2000	Pent II-300	32M	3.2G	24X	Matrox 4MB	2549
Deskpro 4000N*	P166MMX	32M	1.6G		10/100TX	1129
Deskpro 4000N*	P233MMX	32M	2.1G		10/100TX	1479
Deskpro 4000S**	P166MMX	16M	2.1G		10/100TX	1089
Deskpro 4000S**	P233MMX	32M	2.1G		10/100TX	1499
Deskpro 4000	P166MMX	16M	2.4G		10/100TX	1279
Deskpro 4000	P166MMX	32M	3.2G	16X	10/100TX	1649
Deskpro 4000	P233MMX	32M	3.2G	16X	10/100TX	1919
Deskpro 4000	Pent II-233	32M	3.2G	24X	10/100TX	2099
Deskpro 4000	Pent II-300	32M	3.2G	24X	10/100TX	2649
Deskpro 6000	Pent II-233	32M	2.1G	24X	Ultra SCSI	2399
Deskpro 6000	Pent II-266	32M	4.3G	24X	Ultra SCSI	2899
Deskpro 6000	Pent II-300	64M	4.3G	24X	Ultra SCSI	3539

* no floppy drive, no open expansion bays. ** with floppy & 1 open expansion bay.

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Equium 5230D	P233MMX	32M	3.0G	24X	10BT / audio	1799
Equium 6230D	Pent II-233	32M	3.0G	24X	10BT / audio	2169
Equium 6260M	Pent II-266	32M	4.0G	16X	10BT / audio	2569

SERVERS

COMPAQ

Prosignia 200	Pent II-233	32M	no HD	16X	Netelligent	2199
Proliant 800	Pent Pro 200	32M	no-HD	8X	Auto Recovery	2329
Proliant 850R	Pent Pro 200	32M	no-HD	8X	Web Server	3329
Proliant 2500	Pent Pro 200	32M	no-HD	8X	5 Plug. Bays	4199
Proliant 5000	Pent Pro 200	128M	no-HD	4X	exp. 2 Proces.	11099
Proliant 6500	Pent Pro 200	128M	no-HD	16X	exp. 4 Proces.	14869
Proliant 7000	Pent Pro 200	128M	no-HD	16X	18 HD Bays	16999

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Netserver E40	Pent Pro 200	32M	no-HD	8X	4 HD Bays	1899
Netserver E45	Pent II- 233	32M	no-HD	24X	4 HD Bays	2179
Netserver LD	Pent Pro 200	32M	no-HD	4X	UW-SCSI	3099
Netserver LH	Pent Pro 200	64M	no-HD	12X	exp. 2 P-Pro	5579
Netserver LXE	Pent Pro 200	64M	no-HD	4X	6 Hotswap Bays	9190
Netserver LXR	Pent Pro 200	128M	no-HD	4X	exp. P-Pro	13999
Netserver LX	P Pro 200dual	128M	no-HD	4X	exp 4 Proces.	16189

IBM

PC Server 315 series	ALL MODELS					IN STOCK
PC Server 325 series	ALL MODELS					IN STOCK
PC Server 330 series	ALL MODELS					IN STOCK
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NOTEBOOKS

COMPAQ

Presario 1610	P150MMX	12.1"D	16M	1.6G	14X		2599

CTX

EZ330S	P133	12.1"D	16M	1.4G	16X		1466
EZ350S	P150	12.1"D	16M	1.4G	16X		1579
EZ354F-K	P150	12.1"Tx	40M	2.0G	16X		2279
EZ364D-K	P166MMX	12.1"D	40M	2.0G	16X		2219
EZ354T-K	P150MMX	12.1"Tx	40M	2.0G	16X		2569
EZ364T-K	P166MMX	12.1"Tx	40M	2.0G	16X		2659

FUJITSU

Lifebook 435OX	P133MMX	12.1"D	16M	1.3G	10X		1699
Lifebook 735OX	P133MMX	12.1"D	16M	1.6G	20X	56K	1899
Lifebook 535TX	P133MMX	12.1"T	16M	2.0G	20X	33.6	2369
Lifebook 765TX	P166MMX	12.1"T	32M	3.2G	20X	56K	3599
Lifebook 585TX	P233MMX	12.1"Tx	32M	4.0G	20X	33.6	4649

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Omnibook 2000SC	P133	12.1"D	16M	1.4G		1979
Omnibook 2000CT	P133	12.1"T	16M	1.4G		2299
Omnibook 5700CT	P150MMX	12.1"T	16M	2.0G		3049
Omnibook 5700CTX	P166MMX	12.1"Tx	16M	2.0G		3999

HITACHI

Visionbook Plus	P133	12.1"D	16M	1.4G	10X	33.6	1679
Visionbook Plus	P150MMX	12.1"D	16M	1.4G	10X	33.6	2149
Visionbook Plus	P166MMX	12.1"T	16M	2.1G	10X	33.6	2799
Visionbook Elite	P166MMX	13.3"Tx	16M	2.1G	10X	56K	4289
Visionbbok Pro	P166MMX	13.3"Tx	32M	3.0G	10X	56K	4499

IBM

Thinkpad 380E	P150MMX	12.1"D	16M	2.1G			2699
Thinkpad 380ED	P166MMX	12.1"D	16M	2.1G	20X		2579
Thinkpad 560E	P166MMX	12.1"T	16M	2.1G			4239
Thinkpad 760XD	P166MMX	12.1"Tx	32M	3.0G	8X	28.8	4429
Thinkpad 765D	P166MMX	13.3"Tx	32M	3.0G	8X	33.6	5599
Thinkpad 770	P233MMX	14.1"Tx	32M	5.4G	DVD	33.6	7599

SHARP

PC9320T	P150MMX	11.3"T	32M	1.6G	10X	33.6	2699
PC9800T	P166MMX	12.1"Tx	32M	2.0G	10X	33.6	3759
PC9820T	P233MMX	13.3"Tx	32M	3.0G	14X	56K	5199
SN1	P150MMX	12.1"T	32M	2.1G	14X	33.6	New
SN2	P166MMX	12.1"T	32M	2.1G	14X	56K	New
TN(M)	P200MMX	12.1"T	32M	2.1G	14X	56K	New

SONY

Valo PCG-707C	P166MMX	12.1"Tx	32M	2.1G	14.5X	33.6	3999
Vaio PCG-717C	PII200MMX	12.1"T	32M	2.1G	14.5X	33.6	3436
Vaio PCG-719C	PII266MMX	12.1"Tx	32M	2.1G	14.5X	33.6	4179

TROGON

SUPERUS	P166MMX	13.3"Tx	16M	2.1G	20X	33.6	3199
SUPERUS	P166MMX	14.2"Tx	32M	2.1G	20X	33.6	4239
SUPERUS	P166MMX	14.2"Tx	32M	3.0G	20X	33.6	4291
SUPERUS	P200MMX	14.2"Tx	32M	3.0G	20X	33.6	4808

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Libretto 50CT	P75	6.1"T	16M	810M			1899
Satellite Pro 440CDX	P133MMX	12.1"D	16M	1.4G	10X	33.6	1929
Satellite Pro 440COT	P133MMX	12.1"Tx	16M	1.4G	10X	33.6	2759
Satellite Pro 460CDT	P166MMX	12.1"Tx	32M	2.1G	10X	33.6	3749
Portege 300CT	P133MMX	10.4"T	32M8	1.6G		33.6	3329
Portege 650CT	P133	11.3"T	16M	1.2G			2399
Portege 660CDT	P150	11.3"T	16M	1.3G	10X		3149
Tecra 510COT	P133	12.1"T	16M	2.0G	10X		2899
Tecra 520COT	P166MMX	12.1"T	32M	2.1G	10X	33.6	4199
Tecra 530COT	P166MMX	12.1"Tx	32M	2.1G	10X	33.6	4599
Tecra 730XCOT	P150MMX	12.1"Tx	16M	2.0G	10X	28.8	3649
Tecra 740CDT	P166MMX	13.3"Tx	16M	3.0G	10X	28.8	4999
Tecra 750CDT	P233MMX	13.3"Tx	32M	4.7G	20X	56K	6499

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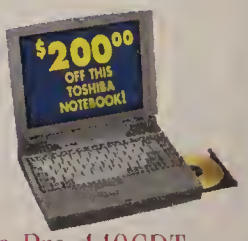

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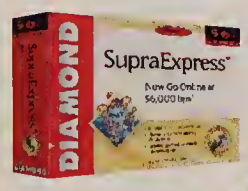

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16 x 32 64 mg	299	299	299
1 x 32 4 mg EDD	17	17	17
2 x 32 8 mg EDD	32	32	32
4 x 32 16 mg EDD	55	55	55
8 x 32 32 mg EDD	109	109	109
16x32 64 mg EDD	289	289	289
256 x 36	14	–	
512 x 36	19	–	
256 x 32	9	–	
512 x 32	19	–	
1 x 36 4 mg	24	24	24
2 x 36 8 mg	48	48	48
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256x4(Page Dip)	–	–	7.25	6 75	6.50
256x4(Page Zip)	–	–	9 25	9 00	8 95
256x4(Video Zip)	–	–	–	10.95	9 95
256x8(SOJ)	–	–	12.00	11.00	–
256x16 SOJ	34 00	29 00	29.00	19.00	–
256x16 SOJ Edo	–	–	29.00	–	–
256x16 Video Zip	–	–	–	29 00	–

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VIDEO MEMORY MODULES

Matrox Millennium	2Meg/4Meg/6Meg WRAM	69/139/189
Matrox Mystique	2Meg SGRAM	59
ATI 30 Pro Turbo	2Meg/4Meg	89, 179
ATI Xclaim 3D	4Meg SGRAM	179
ATI 3D Xpression	2Meg SDRAM	79
Apple PowerMac 4400	2Meg/4Meg	89/139
NEC Powermate Pro 150, 220	2Meg,/6Meg WRAM	129, 259
HP Vectra XV/6, VT/6, VA, XA	2Meg/6Meg WRAM	129, 259
Compaq 1Meg Video 213922-001	1Meg	69
Compaq Deskpro 2000, 4000, 6000	2Meg/6Meg WRAM	129/299

Many More Please Cell

GATEWAY MEMORY

Dest Big Screen D5 – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/359
Oest Big Screen D6 – EOO (pairs)	4Meg/8Meg/16Meg/32Meg	22/38/59/109
Family PC w/MMX – SORAM	8Meg/16Meg/32Meg/64Meg	49/89/159/359
G5-166, 200 Prof System – SORAM	8Meg/16Meg/32Meg/64Meg	49/89/159/359
G5-166M, 200M MMedia System – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/359
G6-200 Prof System – SORAM	16Meg/32Meg	89/159
G6-Prof, M MMedia System – EDD	4Meg/8Meg/16Meg/32Meg	24/44/68/139
Multimedia G-5 Systems – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/359
Prof. P-5 Series – SDRAM	8Meg/16Meg/32Meg/64Meg	49/89/159/359

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NEC MEMORY

Ready 5010, 7010, 7020, 9010, 9022 / Ready 9510, 9520, 9522, 9530, 9532 / Ready 7022 (EDO)
Image P60, P90, 0, P100E
(Pairs) *4Meg/8Meg/16Meg/32Meg — 22/39/66/129 — We Carry All NEC Memory*

HEWLETT PACKARD MEMORY

Netserver 4/66LC-5/133LC (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Netserver LE 486SX33 – 486DX266	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Netserver LH Plus 5/133, 5/166 (EDO, ECC)	16Meg/32Meg/64Meg/128Meg	99/189/409/875
Netserver 4/33LM – 5/100LM (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Netserver 5/75LS – 5/133 LS4 (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Pavillion 5010-7170 (pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra 500 (EOO, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra VA 6/180, 6/200 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra VE2 5/75 – 5/133 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra XA 6/180, 6/200 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	22/42/59/119
Vectra XM4 Series	4Meg/8Meg/16Meg/32Meg	22/42/59/119

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IBM APTIVA, PC, P/S1 & P/S2

Aptiva 300, 500 Series	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva 700 Series (pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva A Series (pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva C Series (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
Aptiva M Series	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 330 Models 6571-6576	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 330 Model 6577 (EDD, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 340 (EOO, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 350 Models 6581-6585	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 350 Model 6586 (pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 350 Model 6587 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 360	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC 730 Models 6875-6876 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC 730 Model 6877 (EOO, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC 750 Models 6885-6886 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC 750 Model 6887 (EOO, pairs)	4Meg/8Meg/16Meg/32Meg	20/39/59/129
PC Server 310 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
PC Server 500 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249
P/S 1, 30 Pin Simms	1/Meg/4Meg	12/34
P/S 1, 72 Pin Simms	4Meg/8Meg/16Meg/32Meg	28/54/69/139
P/S 2, 55SX, 65SX	4Meg	39
P/S 2, 53, 53LS, 56, 57	4Meg/8Meg	39/69
P/S 2, 95XP (ECC, pairs)	4Meg/8Meg	49/79
P/S 2 Server, 95, 195, 295 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249

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IBM NOTEBOOK & LAPTOP MEMORY

MOOEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Thinkped 340, 345, 355, 360, C, CE	*4Meg/8Meg/16Meg*	*49/79/139*	*129.00*
Thinkpad 365C, CS, CD, E, ED	*4Meg/16Meg*	*39/119*	*129.00*
Thinkpad 365X, 365XD	*8Meg/16Meg/32Meg*	*50/119/269*	*129.00*
Thinkpad 380, 380D, 385D	*8Meg/16Meg/32Meg64Meg*	*79/139/239549*	*129.00*
Thinkpad 500, *510CS*	4Meg/8Meg/16Meg	59/79/139	*189.00*
Thinkpad 560, 560E	8Meg/16Meg/32Meg/64Meg	59/119/269/529	
Thinkpad 700, 720, 750, CL57SX	*4Meg/8Meg/16Meg/32Meg*	*39/79/150/268*	*179.00*
Thinkpad 701, 701C, 701CS	*4Meg/8Meg/16Meg/32Meg*	*39/64/119/299*	*199.00*
Thinkpad 739T, TE	*4Meg/8Meg/16Meg*	*49/89/139*	*119.00*
Thinkpad 755C, CE, CD, CS	*4Meg/8Meg/16Meg/32Meg*	*39/79/129/259*	*159 09*
Thinkpad 760C, CD, L, LD	*4Meg/8Meg/16Meg/32Meg*	*39/69/119/299*	*159.00*
Thinkpad 769E, ED, EL, ELD	*8Meg/16Meg/32Meg*	*59/119/269*	*159.09*
Thinkped 769XD, 760XL	*8Meg/16Meg/32Meg/64Meg*	*79/129/279/549*	*159/269*
Thinkpad 765D, 765L	*8Meg/16Meg/32Meg64Meg*	*79/129/279/549*	*159/269*
Thinkpad 770 (SDRAM)	16Meg/32Meg/64Meg	149/319/649	

COMPAQ MEMORY MODULES

Deskpro 486/25, 33L, 50L	2Meg/8Meg/32Meg	29/79/199
Deskpro 3/25I, 33I, 4/25IS, 66I	2Meg/4Meg/8Meg	19/39/69
Oeskpro 386, 486 M Series	2Meg/4Meg/8Meg	29/39/69
Oeskpro M Series Expansion 8oard	0K (no memory)	119 00
Oeskpro 450, 4100, 575, 590, 5100, 5133	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 575, 5120, 5133, 5150, 5160 (EOO, pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 2000, 4000, 6000 Series (EOO, pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 5/60M, 5/66M, XE560 (quads)	2Meg/4Meg/8Meg/16Meg/32Meg	19/28/54/69/139
Deskpro XL (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
Deskpro XL 6150, 6209 (ECC, pairs)	8Meg/16Meg/32Meg/64Meg, 128Meg	Call
Deskpro 2000, Presario 4112, 4122, 4712, 4716, 5526, 5528	1Meg Video	39
Presario 5536, 9232, 9234, 9240, 9259, 9260, 9642, 9660	1Meg Video	39
Presario 510, 520, 524, 660, 720, 724, 860	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 920, 924, 954, 974, 978, 992	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 833, 850, 860, 866	4Meg/8Meg/16Meg/32Meg	39/64/119/239
Presario 5528, 7110, 7152	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 7170, 7180, 9536, 9546, 9548, 9564 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 9232, 9234, 9240, 9250, 9642, 9660 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Proliant 1000 5/60, 2000, R, 4000, R (quads)	4Meg/8Meg/16Meg/32Meg	19/28/54/69
Proliant 1500, 1500R (pairs)	4Meg/8Meg/16Meg/32Meg	36/62/99/189
Froliant 4500, 4500R (quads)	4Meg/8Meg/16Meg/32Meg/64Meg	39/64/119/239/599
Proliant 5000, 5000R (pairs)	32Meg/64Meg/128Meg/256Meg	Call
Prolinea 4/25S, 4/33, 4/66	2Meg/4Meg/8Meg	29/39/69
Prolinea (enhanced), MT	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 575, 590, 5100, 5120, 5133 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 5100, 5120, 5133, 5150, 5166 (EDO pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 575E, 100E, 120E, 575MX (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 590MX, 5120MX (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 6150E, 6180E (pairs)	8Meg/16Meg/32Meg	39/59/119
Prosignia 300 5/75, 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
Prosignia 500 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139

COMPAQ NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Armada 1100, 1129T, 1129, 1125	*8Meg/16Meg/32Meg/64Meg*	*69/129/229/540*	*119.99*
Armada 1139, 1139T (pairs)	*4Meg/8Meg/16Meg*	*49/69/129*	*119.90*
Armada 15100M, 15200M, 1550DMT	16Meg/32Meg/64Meg	139/239/579	
Armada 4100, 4110, D, 4120, T, 4130T, 4131T	8Meg/16Meg/32Meg	69/129/239	
Armada 7710MT, 7730MT, 7759OMT	16Meg/32Meg/64Meg	139/239/579	
Concerio 4/25, 433	*4Meg/8Meg/16Meg*	*49/79/124*	*139.00*
Centura 4/25, 4/25C, 4/25CX	*4Meg/8Meg/16Meg*	*49/79/129*	*199 00*
Contura 400C, 499CX, 410C, 410CX	*4Meg/8Meg/16Meg*	*49/79/134*	*199.00*
Centura 420C, 420CX, 430C, 430CX	*4Meg/8Meg/16Meg/24Meg*	*49/79/134/100*	*109.00*
Contura Aero	*4Meg/8Meg/16Meg*	*39/79/139*	*109.00*
LTE 5900, 5100, 5200, 5300	*8Meg/16Meg/32Meg/64Meg*	*69/129/249/469*	*139.09*
LTE Ellte 440C, CX, 4/75CX	*4Meg/8Meg/16Meg/24Meg*	*40/69/139/199*	*139 99*
LTE Lite 425	*4Meg/8Meg/16Meg*	*49/79/136*	*195.00*
Presario 1990, 1910, 1920, 1030, 1070, 1080	*8Meg/16Meg/32Meg*	*59/119/229*	*119.90*
Presario 1207, 1210, 1610	16Meg/32Meg	109/199/419	

DELL MEMORY

Dimension XPS M166S, M2090, P133s, 166s, 200s, P133v, 166v, 200v	8Meg/16Meg/32Meg	49/79/169
Dimension XPS P60, P75, P90, P100 (pairs)	4Meg/8Meg/16Meg/32Meg	20/38/59/119
Oimension XPS P100c, 120c, 133c, 166c, XPS P75T, 100T (pairs) FPM or EDD	4Meg/8Meg/16Meg/32Meg	20/38/59/119
Dimension XPS Pro 150, Pro 200 (quads)	4Meg/8Meg/16Meg/32Meg	28/48/69/129
Oimension XPS Pro 150n, 180n, 200n (Edo pairs)	4Meg/8Meg/16Meg/32Meg	20/38/59/119
Dptiplex GL, GM, GMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	20/38/59/119
Dptiplex GS, GXL, GXM, GXMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	20/38/59/119
Dptiplex GXI, GXpro, 6180, 6200 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg	99/179/399/799
PowerEdge 2100, 4100 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg/256Meg	99/179/399/799/1799

LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED	OK 8d	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631, 641, 645	–	–	39	59	–	–	–	–	–	–	–	–
Canon LBP 430	–	–	19	–	–	–	49	–	–	–	–	–
Canon LBP 860, 1260	–	–	–	19	–	–	49	–	–	59	79	139
Epson Action Laser 1100, 1600	–	–	19	29	–	–	49	–	–	69	89	–
Epson Action Laser II	–	–	74	–	123	–	–	180	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	–	–	74	–	123	–	–	180	–	–	–	–
Epson 1900, 1500, 5000, 5200	–	–	–	49	–	–	98	–	–	–	–	–
HP 2, 2D–	–	–	–	59	–	–	79	–	–	–	–	–
HP 3, 3D, 3P, 2P+	–	–	–	*59*	–	–	*80*	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX	–	–	–	19	–	–	39	–	–	69	–	–
HP 4L	–	–	29	–	–	–	–	–	–	–	–	–
HP 4MP, 4P	–	–	9	19	–	–	34	–	–	59	–	–
HP 4+, 4M+, 4V, 4MV	–	–	9	19	–	–	34	–	–	59	79	139
HP 5, 5M, 5MP, 5N, 5P, 5SI, 5MX	–	–	9	19	–	–	34	–	–	59	79	139
HP 5L, 6L	–	–	–	–	–	–	49	–	–	99	–	–
HP 6MP, 6P	–	–	9	19	–	–	34	–	–	59	79	139
HP Design Jet 200, 220	–	–	–	–	–	–	39	–	–	69	–	–
HP Design Jet 230, 250C	–	–	–	–	–	–	39	–	–	69	89	149
HP Design Jet 330, 350C	–	–	–	–	–	–	39	–	–	69	89	149
HP Oesign Jet 600, 650C	–	–	–	–	–	–	39	–	–	69	–	–
HP Design Jet 650C PS	–	–	–	–	–	–	39	–	–	69	89	149
HP Oesign Jet 700, 750C, Plus, 755	–	–	–	–	–	–	39	–	–	69	89	149
HP Oeskjet 500, 500C, 510, 550.560	–	29	–	–	–	–	–	–	–	–	–	–
HP Oeskjet 1200C, 1200C/PS, 1600C, 1600CM	–	–	–	–	–	–	39	–	–	69	–	–
IBM Laser 4019, 4019E	–	–	–	–	–	109	–	–	–	–	–	–
I8M Laser 4029, 4037	–	–	–	–	–	–	49	–	–	–	–	–
IBM Laser 4030, 4079	–	–	–	*39*	–	–	*69*	–	–	*99*	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	–	–	–	39	–	–	59	89	149
Lexmark Valuwriter 300,600	–	–	29	39	–	–	69	–	–	–	–	–
Lexmark Winwriter 200, 400, 600	–	–	29	39	–	–	69	–	–	–	–	–
Lexmark S Series	–	–	–	–	–	–	–	–	–	–	–	149
NEC 90, 290	–	–	–	89	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	59	–	–	–	–	–	–	–	–
Oki 400E, 400EX, 410E, 410EX	–	–	67	89	169	–	189	–	–	–	–	–
Dki 810E, EX, 600E, EX, 610E, EX	–	–	29	79	–	–	119	–	–	149	229	–
Panasonic 4420/4450I	–	–	–	79	–	–	109	–	–	–	–	–
Panesonic 4419/4430	–	–	–	*59*	–	–	*99*	–	–	–	–	–
Panasonic 4450	–	–	89	–	–	–	–	–	–	–	–	–
Panasonic 4400/5400	–	–	49	69	–	–	109	–	–	–	–	–
Panasonic 4440, 5410	–	–	69	–	–	–	109	–	–	–	–	–
Panasonic 6500	–	–	14	14	–	–	49	–	–	–	–	–
Sharp 9400, 9460, 9600, 9700E	–	–	49	69	–	–	119	–	–	–	–	–
Sharp 9500, E, H, 9700, H	–	–	49	–	–	–	236	–	–	–	–	–

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Compaq Contura 3/25, 4/25	109	Sharp 3010, 3020, 3050, 3060, 3150	129
Compaq Aero, 400, 410, 420, 430	109	Sharp 8700, 8800, 8900	129
Compaq LTe 5000 Series	139	TI Exstensa 450, 455, 510, 515	139
Epson Action Note 650, 660	119	TI Exstensa 550, 555, 560, 570	149
Epson Action Note 800, 866, 880, 910	119	TI Exstensa 600, 605, 650	169
IBM Thinkpad 355, 360	119	Toshiba 400, 405, 410, 415, 420, 425, 430 (NIMH)	219
IBM Thinkpad 365 C, EO, XD	129	Toshiba 100, 105, 110, 115, 200, 205	105
I8M Thinkpad 701	109	Toshiba 2100 Series	99
I8M Thinkpad 750, 755	179	Toshiba 2400, 2450, 1900, 1950, 1960	109
I8M Thinkpad 755 CD, CE, CV, CX	179	Toshiba 4700, 4800, 4850, 4900	109
NEC Versa 2400, 2405, 2430, 2435	159	Toshiba T4500, T4600	159

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Libretto 50CT	8Meg/16Meg	69/118	
Oynapad T200, T200CS		Call	
Tecra 500CDT, CS, 510CDS, COT	*8Meg/16Meg/32Meg/48Meg/128Meg*	*69/118/243/369/1073*	*259 00*
Tecra 520CDT, 530CDT	*6Meg/16Meg/32Meg/48Meg/128Meg*	*69/118/243/Call/Call*	*259.00*
Tecra 700CS, 700CT (SDRAM)	*8Meg/16Meg/32Meg*	*79/129/229*	*279 00*
Tecra 710CDT, 720COT, 730CDT	*8Meg/16Meg/32Meg/64Meg/128Meg*	*79/129/239/539/1079*	*279 00*
Tecra 730XCDT, 740CDT	*8Meg/16Meg/32Meg/64Meg/128Meg*	*79/129/239/539/1079*	*279.00*
T2000SXE	*8Meg*	*94*	*170.00*
T2100 Series	*4Meg/8Meg/16Meg/24 Meg*	*39/59/119/189*	*119 00*
T1900, T4500, T4600, T4700, T4900 All Models	*4Meg/8Meg/16Meg/32Meg*	*39/79/129/239*	*109 00*
T2400, T3400, T3400CT, T3600	*4Meg/8Meg/16Meg*	*49/69/119*	*119 00*
Satellite T100CS, 105CS, 110CS, 110CT, 115CS	*8Meg/16Meg/32Meg*	*74/129/239*	*119.00*
Satellite 200CDS, 205CDS Series	*8Meg/16Meg/32Meg*	*79/129/239*	*119.00*
Satellite 220C0S	8Meg/16Meg/32Meg/48Meg/128Meg	79/129/249/369/1079	
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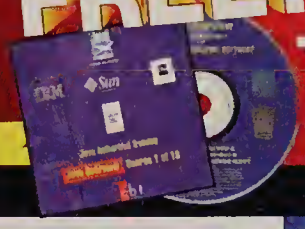

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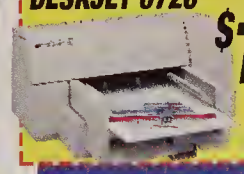

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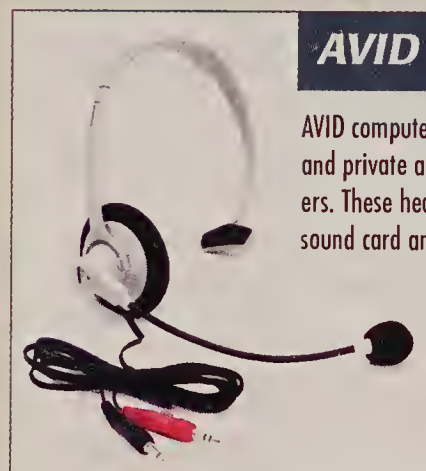

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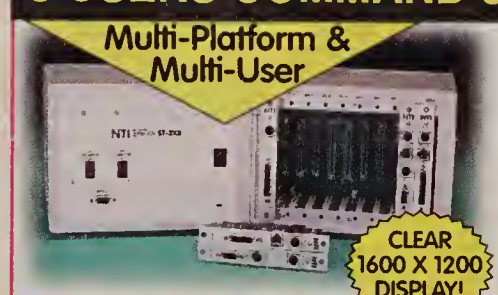

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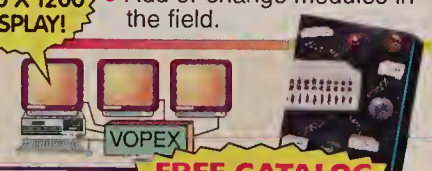

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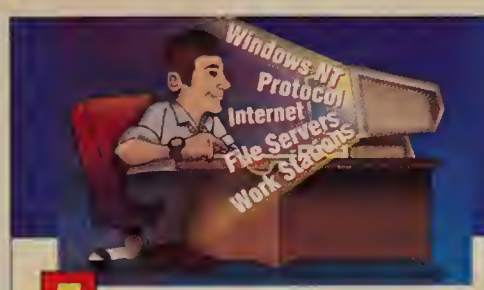

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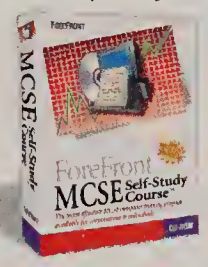

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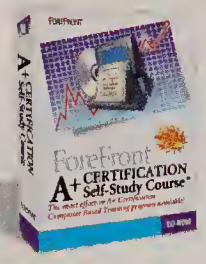

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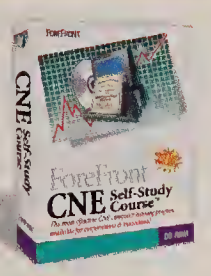

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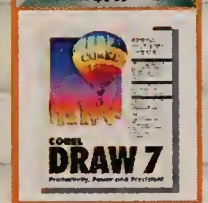

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T4500, C T4600, T4700,T1900, T1910, T1950 (3.3v)	4Meg-8Meg-16Meg	60-80-136
T4850 T4850CT, T4900, T4900CT	4Meg-8Meg-16Meg-32Meg	60-80-135-260
T3400CT, T2400, T3600	4Meg-8Meg-16Meg	40-65-130
T100, 105, 110, 115, 400, 405, 410, 415, 420 425	8Meg-16Meg-32Meg	80-135-240
T400CS 400CDT 105EDD, 600 610, CT EDD	8Meg-16Meg-32Meg	80-135-240

NOTEBOOK MEMORY

MODEL	MEMORY	PRICE
ACERNote 730C, 735C, 760C 760CX, 780CX	4Meg-8Meg	45-70
ACERNote 760I 763 765, 782, 784, 786	4Meg-8Meg-16Meg	45-70-115
ACERNote Light 350, 352, 355	4Meg-8Meg-16Meg	69-125-250
ACERNote Light 350P, 510, 810, 372, 373, 374	8Meg-16Meg-32Meg	89-120-265
ACERNote 970CX, 370/C370CX	4Meg-8Meg-18Meg	40-65-115
ACERNote Light 356, 358, 359, 361(pairs)	4Meg-8Meg-16Meg	35-65-125
ACERNote Pre 950, 954, 955, 957, 959(pairs)	4Meg-8Meg-16Meg	35-60-105
AST Ascentia A40, A41 A42	8Meg-16Meg-32Meg	65-120-265
AST Ascentia P30, P50	8Meg-16Meg-32Meg	79-145-299
AST Ascentia J10, J30, J50 (Install pairs)	8Meg-18Meg-32Meg	65-105-CALL
AST Ascentia 900N, 800N, 810, 910	4Meg-8Meg-16Meg	70-85-130
ASTBrave & Explorer	4Meg-16Meg	55-110
AST Prem Exec 386SX-20-25-25L	4Meg	50
AST Power Exec 3-25, 425EL, 425SL, 4-33SL	4Meg-18Meg	65-140
AT & T Globalyst 130	4Meg-8Meg-16Meg	40-65-135
AT & T Globalyst 250/250P	4Meg-8Meg-16Meg-32Meg	85-120-155-265
AT & T Globalyst 200 Salari 351	8Meg-16Meg	105-189
Cannen Innova Book 1100P, 120T, P-75, P-90	4Meg-8Meg-16Meg	40-69-120
Cannon Innova Book 18300P 75/540C	8Meg-16Meg	65-115
Nete Jet 486	4Meg-8Meg	45-69
Nete Jet III (pairs)	4Meg-8Meg-16Meg	45-69-120
Cannon Innova Book 150, 175	4Meg-16Meg	65-135
Cannon Innova Book 200LS	4Meg-8Meg-16Meg-24Meg	65-95-215-345
Cannon Innova Book 350CD, 360, 475	8Meg-18Meg	65-115
Cannon Innova 486-10	4Meg-16Meg	75-215
CTX EZ Book 5x86 Pent, 500 Pent, 600 Pent Series	4Meg-8Meg-16Meg	40-65-115
CTX EZ Book 700 Pent CTX, X953NS	8Meg-16Meg-32Meg	65-120-245
DEC 325SL, 425SLC, 425SL, 433	4Meg-8Meg-16Meg	69-85-115
DEC 425SE, 433SE	4Meg-16Meg	55-110
DEC 425SL, Premium, 433 SLC	4Meg-16Meg	69-140
DEC Ultra HiNote II 5000 Series	4Meg-8Meg-16Meg-32Meg	40-69-120-320
DEC HiNote, Ultra HiNote	4Meg-8Meg-16Meg	40-80-115
DEC HiNote VP	8Meg-16Meg-32Meg	65-125-245
Epson ActionNote 500C	4Meg	45
Epson ActionNote 910	4Meg-8Meg-16Meg	50-80-165
Epson ActionNote 650, 850C, 660C, 660CX	4Meg-8Meg-16Meg	55-85-125
Epson ActionNote 700, 700C, 700CX	4Meg-16Meg	75-185
Epson ActionNote 880, 866C, 890	4Meg-8Meg-16Meg	45-75-165
Epson ActionNote 4LC-25, 4LC-33, 4SLC-2-50, 400	6Meg	60
Everex Tempe LX, LX20, Carrier	2Meg	85
Everex StepNote 486	4Meg-8Meg	40-115
Fujitsu Mente Carte, Milan, Montego	8Meg-16Meg-32Meg	65-120-265
FMV-Biblo 400 Series	4Meg-8Meg-16Meg	40-70-120
Gateway 2000 Colorbook 4-33	4Meg-16Meg	65-175
Gateway 2000 Nomad 425 DXL-SXL	4Meg-16Meg	155-755
Gateway 2000 486 Handbook or Liberty	4Meg-16Meg	55-165
Hitachi C-Series	8Meg-16Meg-32 Meg	80-145-325
Hitachi E-Series	8Meg-16Meg	80-145
Hitachi M-Series	8Meg-16Meg	100-150
HP Omnibook 300, 480, 425	4Meg	70
HP Omnibook 430	4Meg	69
HP Omnibook 530, 600	4Meg-8Meg-12Meg	60-85-115
HP Omnibook 800CS, CT	8Meg-16Meg-32Meg	65-145-299
HP Omnibook 430	4Meg	69
HP Omnibook 4000	4Meg-8Meg-16Meg	65-89-139
HP Omnibook 5000	8Meg-16Meg-32Meg	85-135-225
HP Omnibook 6000	4Meg-8Meg	85-110
HP Omnibook 800CS, CT	8Meg-16Meg-32Meg	85-145-299
HP Palmtop 200LX	4Meg-8Meg-12Meg-16Meg-20Meg	125-169-210-255-299
Leading Edge Aviva 2000	4Meg-16Meg	65-175
Lexmark SE10	4Meg	65
Magnavox Metalis	4Meg	115
Micron Transport Pentium	8Meg-16Meg	115-215
Midwest Micro Elite, Soundbook, Soundbook CD	4Meg-8Meg-16Meg	75-115-195
Midwest Micro Elite or Soundbook Plus, Soundbook II, IIP	4Meg-8Meg-16Meg	75-115-195
NCR Safari 3180, 3181	4Meg-8Meg-18 Meg	85-119-155
NEC ProSpeed 486	4Meg	40
NEC Ultralite Versa, E, V, MP	4Meg-8Meg-16Meg-32Meg	85-119-155-265
NEC Versa, S, Versa 2000 & 2000D, 500	4Meg-8Meg-16Meg	40-75-115
NEC Versa 2530	8Meg-16Meg	60-115
NEC Versa 2600	32Meg	240
NEC Versa 4000, 4950-4080	4Meg-8Meg-16Meg-32Meg	85-119-155-265
NEC Versa 6000	8Meg-16Meg-32Meg-64 Meg	90-145-245-495
NEC Versa 6200	16Meg-32Meg-64 Meg	119-280-525
Olivetti Echos P75-P1335 (pairs)	4Meg-8Meg-16Meg	35-60-105
Packard Bell Statesman	2Meg-8Meg	40-60
Panasonic CF-V21P, CF-V41	4Meg-8 Meg-16Meg	80-105-155
Panasonic CF-580, CFV21PSX	4Meg16Meg	65-149
Samsung Sens 500 Series	8Meg-16Meg-32Meg	65-120-265
Samsung Sens 810	8Meg-16Meg-32Meg	CALL
Sanyo 17-18 NB	2Meg	85
Sharp 400 Series	8Meg-16Meg-32Meg	80-130-255
Sharp 3030, 3070	8Meg-16Meg	79-145
Sharp 6781, 6881, 6785, 6700, 6800, 6741	2Meg-4Meg	45-60
Sharp 8150, 8650, 8660, 7700, 7760	4Meg-16Meg	60-130
Sharp 8700, 8800, 8900	4Meg-8Meg-16Meg	85-90-140
Sharp 3010, 3020, 3050, 3060	4Meg-8Meg-16Meg	40-65-115
Sharp 9000, 9030	8Meg-16Meg-32Meg	85-130-255
Sharp 9040, 9070 (pairs)	4Meg-8Meg-16Meg	40-65-115
TI Travel Mate 3000	2Meg	50
TI 4000, 4000E, 4000M	4Meg-16Meg	140-715
TI 5000, 5100, 5200, 5300	8Meg-16Meg	85-140
TI 6020, 6030, 6050, 6160	8Meg-16Meg-32Meg	65-120-310
TI Extensa 450, 450T, 455, 455T, 570	4Meg-8Meg-16Meg	40-65-115
TI Extensa, 550, 555 560, 560 (pairs)	4Meg-8Meg-16Meg	35-60-110
TI Extensa 600 Series, 900 Series	8Meg-16Meg-32Meg	65-120-310
Winbook XP	16Meg-32Meg	185-335
Winbook FX	8Meg-16Meg	80-145
Zenith Master Sport SL, SLE, 600, 620, 625NL	2Meg	45
Zenith Z-Note 425LN, LNC, LNP	4Meg	70
Zenith Z-Note MX	4Meg-8Meg-16Meg	60-90-150
Zenith Z-Note GT	8Meg-16Meg-32 Meg	60-115-210
Zenith Z-Note Flex 486, Flex Pentium	4Meg-8Meg-16Meg	40-69-119
Zenith Z-Star 4-33	2Meg-8Meg	40-70
Zenith Z-Star EX	4Meg-8Meg-16Meg	40-65-115

HARD DRIVES
CALL FOR EXTERNAL PRICES ON SCSI, WIDE & NOTEBOOK DRIVES

Seagate

IDE DRIVES				INT
ST31277A	1.2GB	12.5MS	IDE	140
ST31720A	1.7GB	12MS	IDE	155
ST32122A	2.1GB	12MS	IDE	175
ST32132A	2.1GB	12.5MS	IDE	170
ST32531A	2.5GB	12MS	IDE	170
ST33232A	3.2GB	12MS	IDE	195
ST33240A	3.2GB	12MS	IDE	195
ST34342A	4.3GB	12MS	IDE	250
ST34340A	4.3GB	12MS	IDE	255
ST36450A	6.4GB	9.5MS	IDE	355
ULTRA SCSI DRIVES				
ST52160N	2.1GB	11MS	USCSI	225
ST32272N	2.1GB	8MS	USCSI	425
ST34572N	4.5GB	8MS	USCSI	615
ST34501N	4.5GB	7.5MS	USCSI	705
ST19171N	9.1GB	8MS	USCSI	985
ST19101N	9.1GB	8MS	USCSI	1135
ST423451N	23.2GB	13MS	USCSI	2045
ULTRA WIDE SCSI DRIVES				
ST32272W	2.1GB	8MS	UWIDE	455
ST34572W	4.5GB	8MS	UWIDE	655
ST34501W	4.5GB	7.5MS	UWIDE	745
ST19171W	9.1GB	8MS	UWIDE	1025
ST19101W	9.1GB	8MS	UWIDE	1175
ST423451W	23.2GB	13MS	UWIDE	2095
ULTRA WIDE DIFFERENTIAL				
ST32272WD	2.1GB	8MS	UWIDE DIFF	505
ST34572WD	4.5GB	8MS	UWIDE DIFF	650
ST34501WD	4.5GB	7.5MS	UWIDE DIFF	785
ST19171WD	9.1GB	8MS	UWIDE DIFF	1065
ST423451WD	23.2GB	13MS	UWIDE DIFF	2095
SCA-Single Connector Attachment				
ST32272WC	2.1GB	8MS		455
ST34572WC	4.5GB	8MS		655
ST34501WC	4.5GB	7.5MS		755
ST19171WC	9.1GB	8MS		1035
ST19101WC	9.1GB	8MS		1195
FC-AL Fibre Channel-Arbitrated Loop				
ST34501FC	4.5GB	7.5MS		835
ST19171FC	9.1GB	8MS		1065
ST19101FC	9.1GB	8MS		1225

MICROPOLIS

IDE DRIVES				INT
MC4525A	2.5GB	10.5MS	IDE	$180
MC4540A	4.0GB	10.5MS	IDE	240
MC4550A	5.0GB	10.5MS	IDE	300
ULTRA SCSI DRIVES				
MC4743	4.3GB	10MS	U-SCSI	335
MC4345	4.5GB	7.9MS	U-SCSI	525
MC3391	9.1GB	7.9MS	U-SCSI	895
ULTRA SCSI-AV DRIVES (Fine-tuned for Audio & Video applications. 2MB Buffer)				
MC4345AV	4.5GB	7.9MS	U-SCSI-AV	590
MC3391AV	9.1GB	7.9MS	U-SCSI-AV	995
ULTRA WIDE SCSI DRIVES				
MC4743W	4.3GB	10MS	U-WIDE	355
MC4345W	4.5GB	7.9MS	U-WIDE	550
MC3391W	9.1GB	8.5MS	U-WIDE	945
ULTRA WIDE SCSI-AV GOLD DRIVES				
MC4345WAV	4.5GB	7.9MS	U-WIDE-AV	615
MC3391WAV	9.1GB	8.5MS	U-WIDE-AV	1025

Maxtor

IDE DRIVES				INT
M8175DA	1.7GB	12MS	IDE	$170
M821DDA	2.1GB	11MS	IDE	185
M8256DA	2.5GB	10MS	IDE	200
M832D1A	3.2GB	11MS	IDE	215
M8432DA	4.4GB	11MS	IDE	280
M8512DA	5.1GB	10MS	IDE	350
ULTRA IDE DRIVES				
M87DDDD	7.0GB	10MS	U-IDE	455

SIMMS
LIFETIME WARRANTY

30 PIN NON-PARITY/8 BIT	
1MB X 8-60NS SIMM	10
1MB X 8-70NS SIMM	10
4MB X 8-80NS SIMM	25
4MB X 8-70NS SIMM	25
4MB X 8-60NS SIMM	25
30 PIN 9 BIT SIPPS	
1MB X 9-100NS SIPP	20
1MB X 9-80NS SIPP	20
1MB X 9-70NS SIPP	20
1MB X 9-60NS SIPP	20
256K X 9-70NS SIPP	10
30 PIN PARITY/9-BIT	
4MB X 9-70NS SIMM 3 CHIP	25
4MB X 9-60NS SIMM 3 CHIP	25
4MB X9-60NS SIMM 3 CHIP LOGIC	20
4MB X9-70NS SIMM 3 CHIP LOGIC	20
4MB X 9-80NS SIMM 9 CHIP	25
4MB X 9-70NS SIMM 9 CHIP	25
4MB X 9-60NS SIMM 9 CHIP	25
1MB X 9-100NS 9 CHIP SIMM	10
1MB X 9-80NS 3 CHIP SIMM	10
1MB X 9-80NS 9 CHIP SIMM	10
1MB X 9-70NS 3 CHIP SIMM	15
1MB X 9-70NS 9 CHIP SIMM	15
1MB X 9-60NS 3 CHIP SIMM	15
1MB X 9-60NS 9 CHIP SIMM	15
16MB X 9-70NS/60NS SIMM	100
256K X 9-80NS/70NS SIMM	10
72 PIN MEMORY	
256 X 36-1MB-70NS	15
512 X 36-2MB-70NS	25
512 X 36-2MB-80NS	25
1X36-4MB-70NS/60NS LOGIC	25
1X36-4MB-70NS/60NS MAJOR	30
2X36-8MB-70NS/60NS LOGIC	40
2X36-8MB-70NS/60NS MAJOR	50
4X36-16MB-70NS/60NS LOGIC	60
4X36-16MB-70NS/60NS MAJOR	75
8X36-32MB-70NS LOGIC	125
8X36-32MB-60NS LOGIC	125
8X36-32MB-70NS MAJOR	150
8X36-32MB-60NS MAJOR	150
16X36-64MB-70NS/60NS	395
1 X 32-4MB-70NS/60NS	20
2 X 32-8MB-70NS/60NS	35
4 X 32-16MB-70NS/60NS	60
8 X 32-32MB-70NS/60NS	120
16 X 32-64MB-70NS/60NS	350
EDO MEMORY	
4MB/8MB EDO	20/35
16MB/32MB EDO	60/105
PIPELINE CACHE	
256K/512K	20/40

FUJITSU

IDE DRIVES				INT
M1636T	1.2GB	10MS	IDE	$125
MP3017A	1.7GB	10MS	IDE	155
MP3026A	2.6GB	9MS	IDE	175
MP3035A	3.5GB	9MS	IDE	195
ULTRA IDE DRIVES				
MPA3017U	1.7GB	10MS	U-IDE	165
MPA3026U	2.6GB	10MS	U-IDE	190
MPA3035U	3.5GB	10MS	U-IDE	210
MPA3043U	4.3GB	10MS	U-IDE	245
MPA3052U	5.2GB	10MS	U-IDE	310
ULTRA SCSI DRIVES				
M2954S	4.4GB	8MS	SCSI	555
M2949S	9.1GB	8MS	SCSI	955
ULTRA WIDE SCSI DRIVES				
M2954W	4.4GB	8MS	WIDE	565
M2949W	9.1GB	8MS	WIDE	985

WESTERN DIGITAL

IDE DRIVES				INT
AC11200	1.2GB	11MS	IDE	$150
AC21600	1.6GB	12MS	IDE	160
AC22000	2.0GB	11MS	IDE	175
AC22500	2.5GB	11MS	IDE	195
AC33100	3.1GB	12MS	IDE	210
AC34000	4.0GB	11.5MS	IDE	265
AC34300	4.3GB	11MS	IDE	285
AC35100	5.1GB	12MS	IDE	340

Quantum

IDE DRIVES				INT
FB31620A	1.6GB	10MS	IDE	$150
FB32160A	2.1GB	10MS	IDE	180
FB33240A	3.2GB	10MS	IDE	210
FB34320A	4.3GB	10MS	IDE	245
BF4335A	4.3GB	14MS	IDE	210
FB36480A	6.4GB	10MS	IDE	345
FB6510A	6.4GB	14MS	IDE	310
ULTRA SCSI DRIVES				
FB32160S	2.1GB	10MS	USCSI	230
VK32275S	2.2GB	8MS	USCSI	355
FB33240S	3.2GB	10MS	USCSI	295
FB34320S	4.3GB	10MS	USCSI	325
VK34550S	4.5GB	8MS	USCSI	560
XP34550S	4.5GB	8MS	USCSI	665
FB36480S	6.4GB	10MS	USCSI	450
XP39100S	9.1GB	8MS	USCSI	965
ULTRA WIDE SCSI DRIVES				
VK32275W	2.2GB	8MS	UWIDE	355
XP32275W	2.2GB	8MS	UWIDE	295
VK34550W	4.5GB	8MS	UWIDE	560
XP34550W	4.5GB	8MS	UWIDE	665
XP39100W	9.1GB	8MS	UWIDE	965

REMOVABLES/OPTICALS

FUJITSU

REWRITABLE EXTERNAL OPTICAL DRIVES

630MB 3.5" OPTICAL DRIVE INT/EXT	$439-589
OPTICAL CARTRIDGES 230MB OR 630MB	35-59

IOMEGA

Ditto Easy 2.0GB	$149-199
Zip Drive 100MB Int., Ext SCSI/Parallel	149
Jaz Drive 1GB SCSI-II Int/Ext	285-389
Jaz Drive 1GB Cartridge	115

NOTEBOOK DRIVES

TOSHIBA
NOTEBOOK DRIVES/2.5"

MK1002	1.0GB	13MS	IDE	$199
MK1403	1.4GB	13MS	IDE	215
MK21D3	2.1GB	13MS	IDE	295
MK3303	3.0GB	13MS	IDE	450

IBM

IBM THINKPAD 750 & 760 SERIES				
DED/TP756-3.0CD	3.1GB	13MS	IDE	$1095
DED/TP756-2100	2.1GB	13MS	IDE	825
DED/TP756-1600	1.6GB	13MS	IDE	665
DED/TP756-1440	1.4GB	13MS	IDE	585
IBM THINKPAD 760C,CD,E,ED,EL,ELD,L,LD				
DED/TP756-3.0CD	3.1GB	13MS	IDE	$1095
DED/TP760-2100	2.1GB	13MS	IDE	825
DED/TP756-1600	1.6GB	13MS	IDE	665
DED/TP760-1440	1.4GB	13MS	IDE	585
DED/ULTRA-DRV	2nd HDD Ultra Bay Adapt			75
IBM THINKPAD 350, 360, 750, 755				
DED/TP750-2100	2.1GB	13MS	IDE	775
DED/TP750-1440e	1.4GB	13MS	IDE	540
IBM THINKPAD 701 C/CS (Butterfly)				
DED/TP701-2100	2.1GB	13MS	IDE	775
DED/TP701-1600	1.6GB	13MS	IDE	625
DED/TP701-1440	1.4GB	13MS	IDE	540

NEC

VERSA P, M, V, E, VersaBay II				
DED/VERSA-3000	3.1GB	13MS	IDE	$918
DED/VERSA-2100	2.1GB	13MS	IDE	685
DED/VERSA-1440	1.4GB	13MS	IDE	490
VERSA 6000, 4000 & 2000 SERIES				
DED/V246-2100	3.1GB	13MS	IDE	685
DED/V246-1600	2.1GB	13MS	IDE	655
DED/V246-1440	1.6GB	13MS	IDE	625

TAPE BACKUPS

HEWLETT PACKARD

1534	2.0GB TAPE INT/EXT	$579-879
1536	4GB TAPE INT/EXT	609-719
1533AI	4-8GB TAPE DDS2 INTERNAL	899
1533AI	4-8GB TAPE DDS2 EXTERNAL	1099
C1599	4-8GB TAPE DDS2 INTERNAL	859
C1599	4-8GB TAPE DDS2 EXTERNAL	1059
C1554	12-24GB TAPE DDS3 INTERNAL	1249
C1554	12-24GB TAPE DDS3 EXTERNAL	1549
C564BA	72-144GB TAPE DDS3 INTERNAL	2779
C564BA	72-144GB TAPE DDS3 EXTERNAL	3079
4MM	90MT DAT CART (1/5 PK)	12-55
4MM	120MT DAT CART (1/5PAK)	35-170
3.5"-5.25" CONVERSION KIT 1533,1536,1534		39

EXABYTE

B205XL	3.5-7GB TAPE INT/EXT	$1189-1365
B700LT	5-10GB TAPE INT/EXT	1050-1250
8505XL	7-14GB TAPE INT/EXT	1998-2298
B700	7-14GB TAPE INT/EXT	999-1199
8900	20-40GB TAPE 8MM INT/EXT	3769-4069
10H	70-140GB TAPE 8MM INT	4239-4539
8MM TAPES		18

Seagate

4324	2-4GB DAT-DC INT/EXT	$669-869
4326	4-8GB DDS-2 DAT INT/EXT	739-939
224000N	12-24GB DDS-3 DAT INT/EXT	1059-1359
C4586NP	48-96GB DDS-2 DAT INT/EXT	1879-2179
4MM	90MT DAT CART (1/5 PK)	12-55
4MM	120MT DAT CART (1/5PAK)	35-170

DELL DESKTOP MEMORY

MODEL	MODULE/KITS	PRICE
PowerLine Workstations (all)	8-16-32MB	80-145-270
PowerEdge SP (all models)	8-16-32-64MB	80-145-270-425
PowerEdge XE Pentium (all mdls)	16-32-64MB	129-219-425
OmniPlex 560/ME,566/ME,590/ME		
PowerEdge XE 450,466 433 433s	8-16-32-64MB	30-45-90-180
OmniPlex ME Series		
System 433TE, System 425TE	8-18MB	80-145
OptiPlex GXE Series (Pentium)	8-16-32-64MB	70-120-219-425
OptiPlex G & GX Series (Pentium)	8-16-32-64MB	80-115-230-420
Low Profile Power Desktop (all)	4-16MB	30-120
Power Desktop (all models)		
OptiPlex 4100/e 466/e,450/e,433/3	4-16MB	30-90
OptiPlex V Series (all models)		
Performance T. L. M (all models)		
Dimension & Dimension XPS Series 25-39-69-129	4-8-16-32MB	
(Pentium) * Installed in pairs	4-8-16MB EDO	20-35-65

DELL NOTEBOOK MEMORY

MODEL	MODULE/KITS	PRICE
Latitude XPi (Pent), XP (486)	4-8-16MB	40-70-120
Latitude LX (486)	4-8-16MB	55-95-130
Latitude 433m,mc 450mc, mcx	4-8-16MB	55-95-130
Latitude 433; 433c 433cx	4-16MB	55-115

DIGITAL DESKTOP MEMORY

MODEL	MODULE/KITS	PRICE
DECpc MT,MTE(all models)	4-16MB	40-115
Prioris MTE (all models)		
DECpc LP,LPx,LPx+(all models)		
Venturis Series (Pent) * Installed in pairs	4-8-16-32MB	30-55-95-185
Celebris Series (Pentium) * Installed in pairs	4-8-16-32MB	30-55-95-165
Celebris XL Series (Pentium)	8-16-32-64MB	Call
Celebris GL & GLST Series (Pentium) * Installed in pairs	4-8-16-32MB EDO	20-35-65-125
Venturis 560,4100,466 450s2,433	4-8-16-32MB	30-55-95-185

DIGITAL NOTEBOOK MEMORY

MODEL	MODULE/KITS	PRICE
HiNote VP (Pentium)	8-16-32-64MB EDD	69-125-250
HiNote Ultra II (Pentium)	4-8-16-32MB	40-70-120
HiNote Ultra (all models)	4-8-16-32MB	40-70-120
HiNote 486, DX4/75,DX2/50,SX/33	4-8-16-32MB	40-70-120
HiNote VP (Pentium)	8MB EDD	169

GATEWAY DESKTOP MEMORY

MODEL	MODULE/KITS	PRICE
Destination Big Screen PC's P5-75,120,166,166XL,133,150 Family PC, P5-75 100,120 133	4-8-16-32MBEDO	20-35-65-125

HEWLETT PACKARD MEMORY

MODEL	MODULE/KITS	PRICE
Pavilion Series (Pentium) * Installed in pairs	4-8-16-32MBEDO	30-55-95-185
NetServer LF, LM, LM2, LC	4-8-16-32MBEDO	40-65-110-200
Vectra XP/60,VL2 Pent, Vectra		
NetServer LE Series 486DX/33 486SX/33, 486DX/66	4-8-16-32MBEDO	40-65-110-200
NetServer 4/33 LM		
Vectra VE/4 & XM3 Series * Installed in pairs(XM3 Series)	4-8-16-32MBEDO	30-50-90-175
Vectra VE/5,VL4 & XM4 Series * Installed in pairs	4-8-16-32MBEDO	20-35-65-125
Vectra XU 5/90, 90C(GX), 100	4-8-16-32MB	30-55-95-185
Vectra XM3, VL3		
Vectra M2,N2 XM2,(all models)	4-8-16-32MB	30-55-95-185
Vectra VL2 486 (all models)		
Vectra EM, ST Series (all models)	4-8-16MB	35-65-120
Vectra PC (all models)	612MB VRAM Kit, 6MB	45-65
Vectra 486 PC,	4-8MB Module	35-65
Vectra 486/33T, 486/25T	512MB VRAM Kit, 4-8MB	40-35-65
Vectra N, M, NI (all models)	4-8-16-32MB	36-85-120
Vectra 486/66VL, 33VL, 25VL	4-8-16-32MB	36-65-120

MICRON DESKTOP MEMORY

MODEL	MODULE/KITS	PRICE
Pro180 Magnum, 200 Magnum Plus	4-8-16-32MB	25-39-69-129
P133, P266 PowerServer SMP		
4100 PCI Magnum		
P150PCI Millenia, P166PCI Millenia Plus	4-8-16-32MB	20-35-65-125
P75, P100 PowerStation		
P100 Home MPC P150 Home MPC Pro		

NEC DESKTOP MEMORY

MODEL	MODULE/KITS	PRICE
Image Pentium (all models)	4-8-16-32MB	25-39-69-129
Image 4100m,4100es 466ex,450es 433es		
PowerMate Express/II (all models)		
PowerMate Express 486/50Te,66Te	4-18MB	40-110
PowerMate Express 486SX/25Te		
PowerMate Express 486/33e, 66e		
PowerMate V Series (486 & Pent) * Installed in pairs on Pentiums	4-8-16-32MB	40-65-110-220
Power Mate Express 486/50e	4-18MB	40-110
Power Mate Express 486SX/20e,25e		
tm5age 468, 433; 425	4-16MB	40-139
PowerMate 477es; 433es,425es		
Ready 466es, 433es,425es		
PowerMate P60D, P60M	4-8-16-32MB	40-65-110-220
Ready P60M, 433, 425		
PowerMate 4100M, 466M, 4660		
PowerMate 466M		
Ready 4100M, 466m, 4660, 4330		
PowerMate 425, 433, 466	4-18MB	40-140

NEC NOTEBOOK MEMORY

MODEL	MODULE/KITS	PRICE
UltraLite SL/25C, UltraLite III	2-4-8MB	85-125-199
UltraLite SL/20, UltraLite SL/20P	2-6MB	95-100
Versa M, P, V (all models) Versa 4000,4050 4060 4200	4-8-16-32MB	85-119-155-265
Versa S (all models), 500, 550 Versa 2000,2200C,2205,2400CO	4-8-16MB	40-75-115
Versa 6000 (Pentium) Models	8-18-32-64MB	90-145-245-495

Credit Card

LASER PRINTER MEMORY

AMOUNT UPGRADED	0KBd	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631,641,645	—	—	40	59	—	—	—	—	—	—	—	—
Brother HL-4, 4PS, 4V	—	—	70	85	—	—	125	—	—	—	—	—
Brother HL-6 Series	—	—	—	70	—	—	90	—	—	—	—	—
Brother HL-8 Series	—	—	80	100	—	—	—	—	—	—	—	—
Brother HL-10V, 100V, 10PS	—	—	—	65	—	—	85	—	—	—	—	—
Brother HL-10H	—	—	20	—	—	—	35	—	—	55	—	—
Cannon LBP 860, 1260	—	—	—	—	—	—	40	—	—	—	115	225
Cannon LBP4, 4Lite, 4plus	—	—	115	155	—	—	—	—	—	—	—	—
Cannon LBP-8III, 8III Plus, R	—	—	125	165	185	—	—	—	—	—	—	—
Cannon LBP-8II, 8IIR, 8IIT,	—	—	—	85	—	—	130	—	—	—	—	—
Cannon LBP-4SX	—	—	70	85	—	—	—	—	—	—	—	—
Cannon LBP-8SX	—	—	80	100	—	—	—	—	—	—	—	—
Epson 6000, Action Laser	—	—	—	110	—	—	169	—	—	—	—	—
Epson Action Laser 1100	—	—	25	30	—	—	40	—	—	—	—	—
Epson Action Laser 1600	—	—	25	30	—	—	40	—	—	70	115	225
Epson Action Laser II	—	—	—	95	105	—	—	135	—	—	—	—
Epson 8000,1800, 4000, 4100, 4300	—	—	—	95	105	—	—	135	—	—	—	—
Epson 1000, 1500, 5000, 5200	—	—	—	40	—	—	—	—	—	—	—	—
Epson EPL-7000	—	—	75	95	110	—	—	—	—	—	—	—
HP 2, 2D	—	—	—	59	—	—	79	—	—	—	—	—
HP3, 3D 3P, 2P 2P+	—	—	45	55	—	—	80	—	—	—	—	—
HP 4 4M, 4SI, 4SIMX	—	—	25	30	—	—	40	—	—	70	—	—
HP 4P, 4PLUS, 4MPM 1600, 1600CM	—	—	25	30	—	—	40	—	—	70	115	175
HP4L	—	—	30	—	—	—	—	—	—	—	—	—
HP 3SI	—	—	25	30	—	—	40	—	—	70	115	—
HP 5P, 5MP 4V 4MV	—	—	25	30	—	—	40	—	—	70	115	—
HP Design Jet 200, 220	—	—	25	40	—	—	45	—	—	75	—	—
HP Design Jet 600, 650	—	—	—	—	—	—	40	—	—	70	—	—
HP Deskjet 500,500C,510,550,560	—	50	—	—	—	—	—	—	—	—	—	—
HP Deskjet 650C, 750C, 700	—	—	—	—	—	—	35	—	—	55	85	175
HP Laser Jet 6P, 6MP	—	—	20	30	—	—	35	—	—	55	85	—
HP Color Laser Jet 5 5M	—	—	—	30	—	—	35	—	—	55	85	175
HP Copy Jet M	—	—	20	30	—	—	35	—	—	55	85	—
HP Deskjet 1200C, 1200C-P	—	—	30	40	—	—	45	—	—	80	—	—
HP Paintjet XL300	—	—	20	30	—	—	35	—	—	55	—	—
IBM Laser 4019, 4019E	—	—	65	85	—	110	—	—	—	—	—	—
IBM Laser 4029, 4037	—	—	25	35	—	—	55	—	—	—	—	—
IBM Laser 4039, 4079	—	—	—	30	—	—	40	—	—	70	—	—
Konica LP-3110, 3115	—	—	115	185	235	—	—	—	—	350	—	—
Kyocera F-800, 800A, 600T	—	—	95	115	—	—	155	—	—	—	—	—
Kyocera F-1000A	—	—	65	—	—	—	—	—	—	—	—	—
Kyocera F 1200S, 2000A, 3000A, 3300	—	—	89	110	—	—	155	—	—	—	—	—
Kyocera F-1500, 1800 2000	—	—	40	—	—	—	—	—	—	—	—	—
Kyocera F-3500, 5500 3400	—	—	25	30	—	—	40	—	—	—	—	—
Kyocera F-1550 FS-1550+	—	—	25	30	—	—	40	—	—	—	—	—
Kyocera FS-1600 FX1600+	—	—	25	30	—	—	40	—	—	70	115	225

LASER PRINTER MEMORY

AMOUNT UPGRADED	0KBd	256k	1	2	3	3.5	4	5	6	8	16	32
Kyocera FS-3600, FS-3600+	—	—	25	30	—	—	40	—	—	70	115	225
Lexmark Medley 4C, 4X, 4SX	—	—	Call	Call	Call	—	—	—	—	—	—	—
Lexmark Optra L, LX, R, RX	—	—	—	30	—	—	35	—	—	55	85	170
Lexmark Valuwriter 200,300,400,600	—	—	25	35	—	—	45	—	—	—	—	—
NEC 90, 290	—	—	—	125	—	—	—	—	—	—	—	—
NEC Silentwriter 95, 95fx, 97, 97fx	—	—	35	40	—	—	—	—	—	—	—	—
Oki 400	—	—	65	80	—	—	—	—	—	—	—	—
Oki 400E, 400EX, 410E, 410EX	—	—	85	100	—	—	135	—	—	—	—	—
Oki 610E, EX, 600E EX, 610E, EX	—	—	85	100	—	—	135	—	—	—	—	—
Oki 800, 820	—	—	85	105	—	—	149	—	—	—	—	—
Okidata 830, 840	—	—	—	85	—	—	—	—	—	—	—	—
Okidata 1200, OL-1200EX	—	—	—	35	—	—	55	—	—	100	—	—
Okidata 2350, 2450	—	—	Call	Call	—	—	—	—	—	—	—	—
Packard Bell PB 9600	—	—	—	110	—	—	160	—	—	—	—	—
Panasonic 4420, 4450I	—	—	70	85	—	—	120	—	—	—	—	—
Panasonic 4410, 4430	—	—	70	85	—	—	120	—	—	—	—	—
Panasonic 4450	—	—	60	—	—	—	—	—	—	—	—	—
Panasonic 4400, 5400	—	—	45	50	—	—	65	—	—	—	—	—
Panasonic 4440, 5410, 6500	—	—	60	65	—	—	90	—	—	—	—	—
OMS PS-860, Colorscript 210, 310	—	—	—	—	—	—	40	—	—	70	—	—
OMS PS-410	—	—	80	100	—	—	135	—	—	—	—	—
OMS PS-815, 825, 815MR, 825MR	—	—	—	145	—	—	185	—	225	—	—	—
OMS 1000 Magic Color LX	—	—	—	—	—	—	40	—	—	70	115	225
OMS 3325 3825 Print System	—	—	—	—	—	—	40	—	—	70	115	225
OMS 2060 Image Server	—	—	—	—	—	—	40	—	—	70	115	—
Seikosha OP-104	—	—	45	—	—	—	—	—	—	—	—	—
Seikosha OP-108	—	—	45	60	—	—	—	—	—	—	—	—
Sharp 400 Series	—	—	—	—	—	—	99	—	—	—	165	299
Sharp JX9680	—	—	25	—	—	—	40	—	—	—	115	—
Sharp 9400, 9460, 9600 9700E	—	—	65	75	—	—	100	—	—	—	—	—
Sharp 9500, E, H, 9700, H	—	—	65	—	—	—	145	—	—	—	—	—
Star Laser Printer 4 & Starscript	—	—	95	135	—	—	205	—	—	—	—	—
Star Laser Printer LS-5, 5EX 5TT	—	—	130	150	—	—	255	—	350	—	—	—
Star Laser Printer 8	—	—	110	—	—	—	—	—	—	—	—	—
Star Laser Printer 8 II	—	—	110	140	—	—	195	—	—	—	—	—
Tec LB-1305B	—	—	—	110	—	—	160	—	—	—	—	—
Tec LB-1321C	—	—	45	—	—	—	—	—	—	—	—	—
Tec LB-1323D	—	—	45	60	—	—	—	—	—	—	—	—
Tektronix Phaser 200E 200I	—	—	—	—	—	—	55	—	—	—	—	—
Tektronix Phaser 540 480 440	—	—	—	—	—	—	—	—	—	—	115	—
Tektronix Phaser 550	—	—	—	—	—	—	—	—	—	—	115	225
Tektronix Phaser 140, 240, IISO, IISOX	—	—	—	—	—	—	55	—	—	—	115	—
Tektronix Phaser 340	—	—	—	—	—	—	55	—	—	—	—	—
TI XL-PS17-PS35, Micro Writer	—	—	45	65	—	—	—	—	—	—	—	—
TI Microlaser Pro E, Powerpro 600	—	—	45	65	—	—	75	—	—	115	—	—

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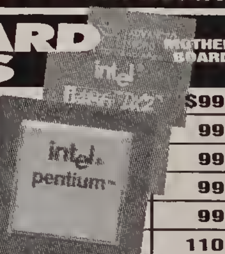

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PENTIUM-133 PROCESSOR	3-PCI, 3-ISA, 512K PIPELINE, 1 PCI-ISA SHARED FLASH BIOS, 4-72 PIN, UP TO 128MB RAM	99	210
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PENTIUM-166 PROCESSOR	3-PCI, 3-ISA, 512K PIPELINE, 1 PCI-ISA SHARED FLASH BIOS, 4-72 PIN, UP TO 128MB RAM	99	245
PENTIUM-200 PROCESSOR	3-PCI, 3-ISA, 512K PIPELINE, 1 PCI-ISA SHARED FLASH BIOS, 4-72 PIN, UP TO 128MB RAM	99	340
MMX-166 PROCESSOR	3-PCI, 3-ISA, 512K PIPELINE, 1 PCI-ISA SHARED FLASH BIOS, 4-72 PIN, UP TO 128MB RAM, 82430TX CHIPSET	110	275
MMX-200 PROCESSOR	3-PCI, 3-ISA, 512K PIPELINE, 1 PCI-ISA SHARED FLASH BIOS, 4-72 PIN, UP TO 128MB RAM, 82430TX CHIPSET	110	395
MMX-233 PROCESSOR	4-PCI, 3-ISA, 512K PIPELINE, 4-72 PIN, 2 DIMM UP TO 512MB RAM, AT OR ATX, 82430TX CHIPSET	110	545
PENTIUM II 233 PROCESSOR	4-PCI, 3-ISA, 4-72 PIN, 2 DIMM, TX FORMFACTOR UP TO 512MB RAM, AT OR ATX, LX CHIPSET	209	779
PENTIUM II 233 PROCESSOR	5-PCI, 3-ISA, 4-72 PIN, 2 DIMM, TX FORMFACTOR UP TO 512MB RAM, ATX, LX CHIPSET	289	884
PENTIUM II 266 PROCESSOR	5-PCI, 3-ISA, 4-72 PIN, 2 DIMM, TX FORMFACTOR UP TO 512MB RAM, ATX, LX CHIPSET	289	1019
PENTIUM II 300 PROCESSOR	5-PCI, 3-ISA, 4-72 PIN, 2 DIMM, TX FORMFACTOR UP TO 512MB RAM, ATX, LX CHIPSET	289	1355
CYRIX-M2-166+ PROCESSOR	4-PCI, 3-ISA, 4-72 PIN, 2 DIMM UP TO 512MB RAM, AT OR ATX, 82430TX CHIPSET	110	225
CYRIX-M2-200+ PROCESSOR	4-PCI, 3-ISA, 4-72 PIN, 2 DIMM UP TO 512MB RAM, AT OR ATX, 82430TX CHIPSET	110	275
INTEL 486DX2-66	256C VLB, 7-ISA, 2-VLB, 4-30 PIN 3-72 PIN ENHANCED BIOS	95	130
INTEL 486DX4-100	256C VLB, 7-ISA, 2-VLB, 4-30 PIN 3-72 PIN ENHANCED BIOS	95	149
AMD 486DX4-133	256C VLB, 7-ISA, 2-VLB, 4-30 PIN 3-72 PIN ENHANCED BIOS	95	229
AMD-K6-166 PROCESSOR	4-PCI, 3-ISA, 4-72 PIN, 2 DIMM UP TO 512MB RAM, AT OR ATX, 82430TX CHIPSET	99	259
AMD-K6-200 PROCESSOR	4-PCI, 3-ISA, 4-72 PIN, 2 DIMM UP TO 512MB RAM, AT OR ATX, 82430TX CHIPSET	99	345
AMD-K6-233 PROCESSOR	4-PCI, 3-ISA, 4-72 PIN, 2 DIMM UP TO 512MB RAM, AT OR ATX, 82430TX CHIPSET	99	499

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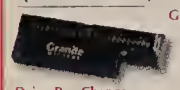
Gender Changer



Drive Bus Changer (run 68 pin on 50 pin bus

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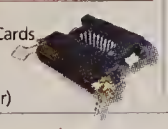

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- Test Cable Integrity
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Features:
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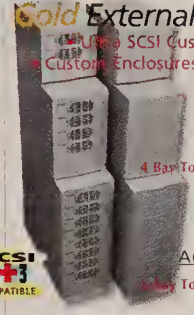

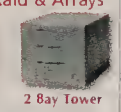

From: $99

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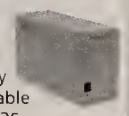
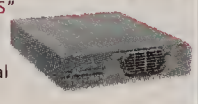
The Vertical 3.5" Case Kit offers a small transportable package. Ideally suited for moving around, this durable case can take a beating. Universal 3S Watt power supply.



From: $59

The Horizontal 3.5" or 5.25" Case Kit Offers a stackable solution for any desktop need. Shown with Optional Bay Cooler installed.



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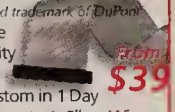

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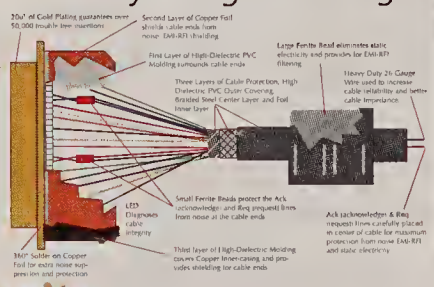

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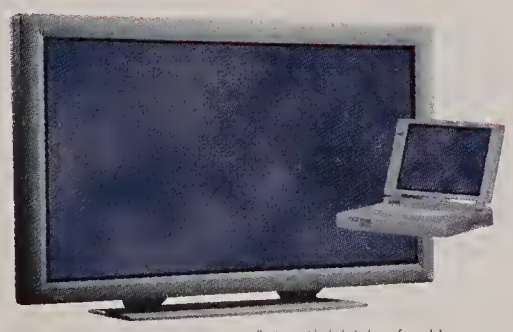

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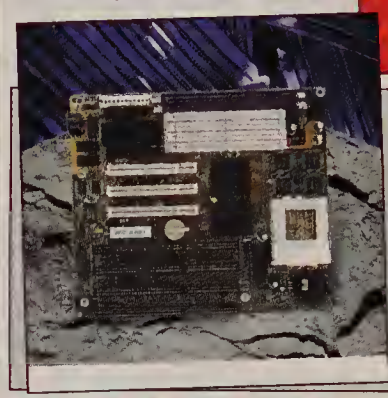

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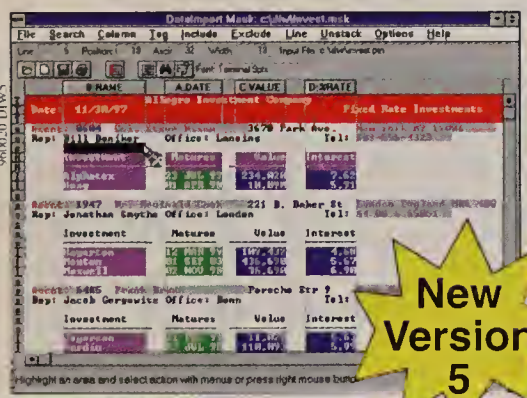

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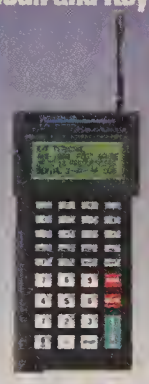

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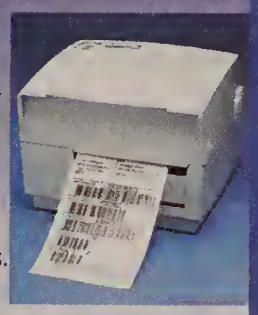

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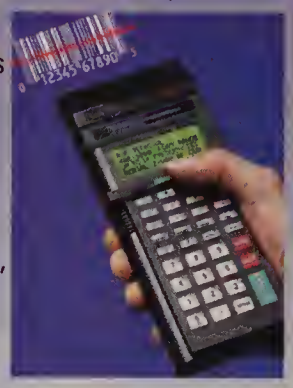

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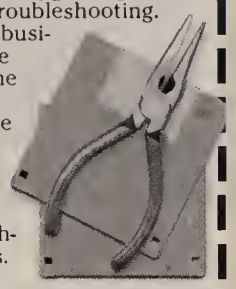

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Circle 171 on reader service card

1997: A Pretty Good Year for Hardware

MAYBE IT'S THE HOLIDAY SPIRIT. Maybe it's one party toast too many. Maybe I've just watched *It's a Wonderful Life* once too often. But as I look back on the past year in computerdom, even the Scrooge in me has to admit it's been a pretty good one.

As usual, software innovations lagged far behind hardware advances. The happy exception was the long-awaited advent of dictation software that lets you use continuous speech *and* a broad vocabulary—first delivered by Dragon Systems' NaturallySpeaking software. But even that breakthrough—in my view, the year's most important—was made possible by today's faster PCs with lots of memory and big, fast hard drives.

PRICES PLUMMET

BETTER YET, the cost of hardware has been in free fall. The cheapest PC you can buy today is much faster than the top-of-the-line model that cost me three times as much just three years ago. The big news isn't the rapid increase in performance—that's been happening for years—but PC makers' willingness to cut prices and offer decent machines for under $1000.

The **big news** isn't the rapid increase in **performance,** but PC makers' offering decent machines for under **$1000.**

The explosion of reasonably priced laptops has been another boon. Nowadays, $2500 will get you a notebook computer that does everything you want it to. Even the way-below-$2000 market offers lots of good values. The vast majority of users simply never will need the power and features that are stuffed into the expensive top-of-the-line models, which I call "executive vanity appliances."

Other price cuts have been almost as important. Memory is so cheap you can stock up on it to squeeze another few months of useful life out of an old clunker. Monitor prices have not dropped anywhere near as fast, but excellent 17-inch units now cost hundreds of dollars less than they did not so long ago.

This was also the year that digital imaging came of age for the average user. Improvements in color ink jet printers over the past few years have been remarkable, but this year the best ones from Hewlett-Packard and Epson became so good they can produce output that fools you into thinking you're looking at a photograph. They even do it at acceptable speeds.

Scanners that do a decent job with both color and monochrome images have become cheaper than ever. And $500 will buy Hewlett-Packard's PhotoSmart scanner, which can produce stunning images from negatives and slides—if you can get past the tricky installation process and the glitches in the software.

PICTURE IMPERFECT

LOW-COST DIGITAL CAMERAS have improved in the past year, but they remain the weak link in the imaging chain. Their output is no match for film, but they can be handy if you need a small, quick shot for a newsletter or Web site. Features like LCD preview screens, zoom lenses, removable memory, and higher-resolution images are becoming common, but the current situation reminds me of the ink jet printer market a few years ago. Digital cameras are still in their infancy and will likely get a lot better soon.

I'm more bullish on tiny devices. Franklin Electronic Publishers' REX, the personal-information-manager-on-a-PC-Card, set a new standard of teensiness by keeping you from entering data on it directly. At the other end of the gizmo scale, the new Psion Series 5 has a keyboard you can actually type on. But the PC-side apps for both devices leave much to be desired.

And how could we forget the ActiMates Interactive Barney? This plush stuffed dinosaur moves his head and arms, talks, and even plays peekaboo; a built-in radio transceiver lets His Purpleness communicate with CD-ROM based software for kids. And that's just the start. Spending $100 on Barney gives you the chance to spend hundreds more on software and transmitters for your TV and computer. But the critter is just so darned cute, I've seen it charm the socks off even crusty, hard-bitten Microsoft haters.

Which brings us to the year in software, about which the less said, the better. All in all it's been a pretty good year in the land of computing, but as Ebenezer Scrooge's descendants might put it: Bah, humbug. Software still sucks.

PC World *contributing editor Stephen Manes is a columnist for the* New York Times *and one-half of the* Digital Duo, *airing on public television stations nationwide.* ■

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Editing editor Stephen Manes is a columnist for PC World and one-half of the Digital Duo, *airing on stations nationwide.* ■

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